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STUDIES ON POLIOMYELITIS IN ONTARIO*

1. Observations on the Apparent Infectiousness of the Acute Case

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THE object of this investigation is to study from year to year the behaviour of poliomyelitis in a largely rural area where the population is stable, and human contacts are relatively restricted. In the summer and fall of the first year of the study (1948) 28 probable cases were investigated, it being possible in many instances to trace infection to direct contact with another case. Persons suffering from the milder forms of the disease seemed to play the major rôle in dissemination of infection.

Dufferin County, Ontario, has been selected for this study, for the following reasons: (1) The population of 14,000 is widely distributed over an area of 557 square miles, with two-thirds living on large farms or in villages. There are only 3 towns, none large: Orangeville (2,800), Shelburne (1,160), and Grand Valley (660). (2) The County is never heavily populated by tourists, and the resident population is relatively stable; there are only two main highways. (3) The number of physicians is small, and it has been possible to maintain close personal contact. (4) There is a full time health officer, assisted by a sanitary inspector, and 2 public health nurses. (5) A few cases of poliomyelitis have been reported yearly for many years.

ORGANIZATION OF THE STUDY

In the early summer of 1948, physicians were asked to report to the medical officer of health (M.O.H.) suspected cases of poliomyelitis, including examples of the milder forms of illness; the M.O.H. telephoned the field worker, who then visited the case.

Enquiries were directed toward determining the probable source of infection of each case, and use was made of a "common data" form embracing questions asked in the investigation of respiratory, intestinal, and insect-borne diseases. Particular enquiry was made regarding the following: the activities of the sick person in the 4 weeks preceding onset; contact of the sick person with other cases of poliomyelitis or their close relatives; the health of visitors to the home; and the health of the family contacts for 4 weeks before the onset of illness in the case, and for at least the same period afterward. As far as possible, all close contacts of the case were visited.

Our attention became drawn increasingly to the occurrence of mild illnesses, compatible with a diagnosis of the form of poliomyelitis known as the "minor illness", among close contacts of patients. To obtain more information about the prevalence of such illnesses, an enquiry was started at the public school in Orangeville, where most of our cases occurred. Starting about 4 weeks after the opening of the school on September 7, 1948, regular clinics were held, attended by the mothers of the younger children, and personally by the older children. By this means, we obtained case histories from several

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TABLE I.

CLINICAL MANIFESTATIONS OF 28 POLIOMYELITIS CASES IN DUFFERIN COUNTY

	Minor illness type																*Non-paralytic type*								*Paralytic type*			
Initials of Patient	*M.R.*	*M.H.*	*D.M.*	*R.R.*	*R.H.*	*D.V.*	*R.P.*	*I.A.*	*P.C.** 1 2	*P.Cl.** 1 2	*L.B.*	*E.M.*	*B.F.*	*J.H.** 1 2	*F.C.*	*M.D.*	*Mrs. R.*	*M.S.*	*Mrs. K.*	*Mr. K.*	*B.M.*	*A.A.*	*H.C.** 1 2	*B.D.*	*R.B.*	*S.C.*	*R.G.*	*G.F.*
Fever	+	+	+	+	+	+	+	+	++	++	+	+	+	++	+	+	+	+	+	+	+	+	++	+	+	+	+	+
Headache		+	+	+	+			+	++	+		+		++		+	+	+	+	+	+	+		+	+	+	+	
Vomiting	+	+	+		+		+	+	++		+	+		+			+		+	+		+			+	+	+	+
Drowsiness	+	+	+		+					+	+	+	+	+		+	+	+	+	+	+		+	+	+	+		+
Constipation	+	+	+		+				++	+		+		+	+		+		+			+	+	+	+		+	+
Anorexia				+		+	+			+	+		+		+	+	+		+		+	+	++	+	+	+	+	
Nausea							+	+	++			+	+	+		+	+	+	+	+				+	+	+	+	
Change in temperament	+		+			+				+		+			+										+			
Myalgia					+	+	+		+				+					+	+				+		+		+	+
Irritability			+		+	+						+									+					+	+	
Tremor					+						+		+	+					+							+	+	
Listlessness			+		+						+						+	+			+		+	+	+		+	
Soreness or redness of throat						+					+					+								+	+	+		+
Diarrhœa								+																				
Hyperæsthesia																							+			+		
Stiffness and soreness of neck																	+	+	+	+	+	+	+	+	+		+	
Paralysis																									+	+	+	+

*"Dromedary" cases; manifestations of first and second phases (1 and 2) shown separately.

children strongly suggestive of minor illnesses. Similar investigations were made at two other schools.

CLINICAL FEATURES OF POLIOMYELITIS IN DUFFERIN COUNTY

The paralytic and bulbar varieties of poliomyelitis can be diagnosed with sufficient accuracy by clinical methods. The problems of the differential diagnosis of the milder forms of the disease vary in different parts of the country, but observations that we made in 1947 suggested that in Ontario, known neurotropic viruses other than poliomyelitis can be virtually excluded as causes of an epidemic disease characterized by meningeal irritation.[1, 2]

Our 28 cases included examples of the four clinical forms, there being 1 patient with bulbar paralysis, 3 patients with spinal paralysis, 8 with definite meningeal irritation only (non-paralytic poliomyelitis), and 16 with the still less severe form known as the poliomyelitis minor illness. The clinical manifestations are set out in detail in Table I.

There has been considerable discussion regarding the specificity of the clinical manifestations characteristic of the subclinical, abortive, or minor illness variety of poliomyelitis.[3] These manifestations comprise fever, headache, vomiting, drowsiness, constipation, anorexia, nausea, change in temperament, myalgia, irritability, tremor, listlessness, and sore throat. The observations of a Chicago group[4, 5, 6] suggest that this is the commonest form of poliomyelitis, and occurs in a high proportion of close child contacts of patients suffering from the more severe varieties of the disease. They believe also that this syndrome seldom occurs except in poliomyelitis.

There is no doubt in our minds that the minor illness is a manifestation of poliomyelitis, for the following reasons: We have recovered virus from the stools of 2 such patients. The symptoms and signs are identical with those occurring in the non-paralytic form of the disease or in the pre-paralytic phase, as is well brought out in Table I. Examples of minor illness, non-paralytic illness, spinal and bulbar paralysis occurred in children who had close contact one with another. We feel justified, therefore, on laboratory, clinical, and epidemiological evidence, in accepting the minor illnesses encountered in this study as manifestations of infection with the virus of poliomyelitis.

It seems logical to suggest that some persons infected with poliomyelitis virus will develop perhaps only one of the manifestations regarded as characteristic of the minor illness. From the point of view of an enquiry such as this, however, it is not possible to regard such non-specific ailments as diagnostic of poliomyelitis. It is known further, that some infected persons develop no illness, but nevertheless excrete the virus.

One last type of illness remains to be discussed, the so-called "dromedary" form, where there are two periods or "humps" of fever, separated by several days of normal health. We had 4 such cases, and in 3 the features in the second period of fever were those of a minor illness. In previous descriptions, the second period has been characterized by more pronounced nervous involvement. There are two possible explanations for this illness:[7, 8] the first period may represent an "illness of infection", and the interval between the periods correspond to the incubation; on the other hand, the first period may come at the end of the incubation, and represent a phase of generalized virus invasion, the second indicating nervous involvement. The first of these explanations appears to us to be the more reasonable.

LABORATORY INVESTIGATIONS

Bacteria-free extracts of stools collected in the field study or in hospital were prepared by making a 10% aqueous suspension, and shaking automatically for 15 to 30 minutes with one-third volume of ether. After standing in the cold room overnight, the suspension was again shaken, and then centrifuged at 1,800 r.p.m. for 30 minutes. The aqueous phase was removed, and centrifuged at 2,700 r.p.m.; after 2 or 3 such centrifugations, the suspension was transferred to separatory funnels and shaken with ether, and then placed in the cold room for separation. If this did not result in sufficient clearing, a further centrifugation and ether treatment was given. The next step was to remove the ether in a partial vacuum. Tests for sterility were then prepared, and if no growth was obtained, the material was ready for inoculation.

Raw extracts were prepared by making a 10% aqueous suspension, and shaking automatically for 15 minutes. After standing overnight, the bottle was again shaken, and the contents were poured through a copper screen; the upper layer was used for nasal inoculations, after sedimenting in the cold room for at least one hour.

The usual practice was to inoculate a rhesus monkey cerebrally and peritoneally with bacteria-free extract. If no paralysis developed in 4 weeks, the animal was re-inoculated, usually by the nasal route with raw extract. If no paralysis developed, the animal was killed after 4 to 5 weeks. All animals were examined histologically, and both positive and negative reports are based on the histological findings. Practically all monkeys found positive histologically had shown marked paralysis. If a negative histological report was received, a second monkey was inoculated with freshly prepared extract; in some cases, the stools of three or four patients were pooled for the inoculation of the second animal. All

negative reports, therefore, are based on the inoculation of two monkeys.

Of the 28 cases discussed in this report, the stools of 21 were inoculated in monkeys, and poliomyelitis virus was recovered from 7. The 7 positives were made up of 4 paralytic cases (R.B., S.C., R.G., G.F.), 1 non-paralytic (M.S.), and 2 minor illnesses (R.H., D.V.). Poliomyelitis virus was also demonstrated in a pool of the stools of 4 other cases. A neurotropic agent other than poliomyelitis virus has probably been recovered from another case (B.D.), but further studies are needed before it can be identified.

Only 16 of the specimens were obtained within 3 weeks of onset, and our recovery rate of virus, approximately 50%, from such specimens compares favourably with general experience.

In an endeavour to recover a strain of virus pathogenic to mice, we inoculated a number of bacteria-free stool preparations intracerebrally in 12 to 14 gm. mice. Following the lead of Dalldorf and Sickles,[9] we inoculated these extracts cerebrally in suckling mice also; by this procedure, these authors recovered a filtrable agent from the stools in a poliomyelitis-like outbreak. Extracts were prepared from the following 15 cases, representing 6 excreting poliomyelitis virus, and 9 others: R.B., M.H., R.H., M.S., D.V., P.C., R.P., I.A., P.Cl., R.G., G.F., A.A., B.F., J.H., and H.C. However, no lesions were produced in the older mice, and no manifestations similar to those recorded by Dalldorf and Sickles were noted in the sucklings.

Preparations of cord from monkeys that developed typical poliomyelitis were also inoculated cerebrally in suckling and older mice, but no significant manifestations of illness were induced. The patients represented in this series of tests were R.B., R.H., S.C., M.S., and G.F.

As a further method of investigating the etiology of many of those cases from which no poliomyelitis virus was recovered, tests were performed on the convalescent sera obtained 3 months after onset. Neutralization tests were conducted in mice with the viruses of St. Louis encephalitis, lymphocytic choriomeningitis, and Western and Eastern equine encephalomyelitis. Complement fixation tests for mumps were performed by Drs. W. and G. Henle of Philadelphia. In no test was there any evidence that the illness in question was caused by these viruses. The results of the laboratory tests are shown in Table II.

RESULTS OF FIELD STUDY

Three apparently unrelated outbreaks of suspected poliomyelitis occurred in Dufferin County in 1948, the largest in the town of Orangeville, with two smaller ones in the country districts of Glen Cross and Camilla. In Table II are shown the clinical diagnoses, the results of laboratory tests, and the information gathered regarding the probable sources of infection. The cases are arranged chronologically in order of date of onset of symptoms. It will be appreciated that the details shown were obtained in various ways, such as the study of contacts, and by school enquiries, and that it was often only possible to visualize how the various incidents were connected several weeks after the event.

Orangeville outbreak. — The investigations were initiated by the report of the case R.B.; later, the cases S.C., M.S., B.M., and Mr. and Mrs. K. were reported by physicians. Our enquiries revealed another 11 cases, making a total of 17; of the 17 cases, 3 were adults, and 14 were children aged 3 to 15.

The infection was apparently introduced by Mrs. R., who had an illness suggestive of non-paralytic poliomyelitis during her 3 day visit with her 2 children to the home of her nephew R.B., a bulbar case who had had his tonsils removed one week before the aunt's visit; Mrs. R.'s children both developed minor illnesses after return home (M.R., R.R.). R.B. and the children of Mrs. R. had close contact with M.H., who later developed a minor illness. M.H. probably infected her cousin R.H., who also developed a minor illness, and he in turn seems to have infected his cousin S.C., and playmate M.S.; S.C. actually lived in a village a few miles away, and had no outside contacts apart from regular visits to the home of R.H. in Orangeville.

It was thus shown that the first three cases reported (R.B., S.C., and M.S.) were in fact linked together, and were not unrelated. Thereafter, the infection was transmitted progressively by close personal contact between children. No further transmission of infection was traced after the illness of P.Cl. It is thus evident that patients suffering from minor ill-

TABLE II.

DETAILS OF CASES OF SUSPECTED POLIOMYELITIS (DUFFERIN COUNTY, 1948)

Outbreak concerned	*Initials of case*	*Sex*	*age*	*Date of onset*	*Confined to bed*	*Clinical diagnosis*	*Interval between onset and stool collection*	*Tests for virus in stool (monkey inoculation)*	*Remarks on probable source of infection*
Orangeville	Mrs. R.	F	Adult	June 29	No	Non-paralytic poliomyelitis	63 days	Not tested	Not traced.
	R.B.	M	5	July 8	July 13	Bulbar poliomyelitis	8 days	+	Mrs. R., an aunt, who stayed in R.B.'s home from June 29–July 1.
	M.R.	F	4	July 12	No	Minor illness	51 days	Not tested	Daughter of Mrs. R.
	M.H.	F	4½	July 13	No	Minor illness	34 days	–	Playmate of R.B. and children of Mrs. R.
	D.M.	M	6	July 13	No	Minor illness	50 days	–**	Not traced.
	R.R.	F	5½	July 23	No	Minor illness	40 days	Not tested	Daughter of Mrs. R.
	R.H.	M	8	July 29	No	Minor illness	15 days	+	Frequent contact with cousin M.H. until July 13 and with D.M. throughout July.
	S.C.	F	4	August 4	August 9	Spinal poliomyelitis	10 days	+	Frequent visitor to home of cousin R.H.
	M.S.	M	8	August 8	August 10	Non-paralytic poliomyelitis	4 days	+	Playmate of R.H. from July 26-29 only.
	D.V.	M	3	August 13	No	Minor illness	20 days	+	Frequent contact with cousin M.S. in July and August.
	Mrs. K.	F	Adult	August 14	August 14	Non-paralytic poliomyelitis	4 days	–	Made a trip with trailer in early August, so no enquiries could be made regarding source.
	Mr. K.	M	Adult	August 15	No	Non-paralytic poliomyelitis	3 days	–	
	R.P.	M	15	August 17	No	Minor illness	60 days	*Pool +**	Family contact of D.V. and playmate of M.S.
	I.A.	M	10	September 9	No	Minor illness	54 days	*Pool +**	Contact with R.P. from August 22 onward.
	P.C.	M	10	Dromedary September 10 and 18	No	Minor illness	27 days	*Pool +**	Playmate of I.A.; infection probably occurred about September 9.
	B.M.	M	7	September 13	September 13	Non-paralytic poliomyelitis	10 days	–**	Possibly family of E.M. (see Camilla outbreak below) in last 2 weeks of August.
	P.Cl.	M	6	Dromedary September 17 and 28	September 28	Minor illness	13 days	–**	Schoolmate of B.M.
Glen Cross	L.B.	F	15	August 31	No	Minor illness	Not collected	Not collected	Not traced.
	R.G.	F	10	September 27	September 27	Spinal poliomyelitis	4 days	+	On September 11, L.B., R.G., and A.A. ate and spent the evening together; R.G. visited G.F. on September 19 and had a meal; R.G. and A.A. were also school contacts.
	G.F.	F	2½	September 29	No	Spinal poliomyelitis	13 days	+	
	A.A.	F	15	October 2	October 2	Non-paralytic poliomyelitis	13 days	–	
Camilla	E.M.	F	8	July 20	No	Minor illness	Not collected	Not collected	Not traced.
	J.H.	M	8	Dromedary September 7 and 13	September 13	Minor illness	10 days	–**	B.F. and J.H. were playmates, and were probably infected about September 5 or 6 from a common source.
	B.F.	M	8	September 13	September 13	Minor illness	10 days	–**	
	H.C.	F	16	Dromedary November 3 and 8	November 9	Non-paralytic poliomyelitis	6 days	*Pool +**	Attended party and ate together on November 2 when they may have been infected from a common source.
	F.C.	F	4	November 9	No	Minor illness	Not collected	Not collected**	
	M.D.	F	11	November 9	No	Minor illness	Not collected	Not collected	
	B.D.	F	13	December 4	December 4	Non-paralytic poliomyelitis	5 days	Unidentified** agent present	Also attended this party, but in view of dates probably contracted infection from sister M.D.

*The monkeys inoculated with these stools separately did not develop poliomyelitis, but a further animal inoculated with a pool did become infected.
**The convalescent serum gave negative tests for mumps, St. Louis encephalitis, Western and Eastern equine encephalitis, and lymphocytic chorio-meningitis.

nesses played an important rôle in the spread of the disease.

It was not to be expected that such suggestive evidence of the source of infection would be obtained in every case, and in fact we were unable definitely to trace the source of infection of the children D.M. and B.M., or of the adults Mr. and Mrs. K., who however, were probably infected from a common source when on vacation.

Glen Cross outbreak.—In Glen Cross, the outbreak appears to have been initiated by L.B., suffering from a minor illness, who infected R.G. and A.A. during an evening spent together. R.G. and A.A. were also school contacts. The most interesting feature was the infection of the young girl G.F. who lived on an isolated farm, and had few contacts; G.F. had been visited by R.G., 8 days before R.G. became ill. R.G. may be accepted as an example of the type of carrier known as "precocious" or "incubating". The whole incident illustrates the point made by Horstmann and Paul[7] that it is difficult in a group of apparently related cases to be certain which is primary and which are secondary.

Camilla outbreak.—In this outbreak, the evidence suggests that there were two examples of common source infection, one involving 2 boys (J.H. and B.F.), and the other 3 girls (H.C., F.C. and M.D.). These sources could not be traced, but were probably children suffering from mild attacks of poliomyelitis. There was also one probable instance of direct contact infection, B.D. being infected by her sister M.D.

OBSERVATIONS ON THE INFECTIOUS PERIOD AND INCUBATION PERIOD

Previous studies[10, 11] have suggested that a case of poliomyelitis is infectious to close contacts from a few days before to a few days after the onset of symptoms. This is the only period during which virus can be found in the upper respiratory tract. Virus is also present in the stool at this stage, and continues to be excreted for some weeks, but few observers seem to have traced infection to contact with patients in the later phases of convalescence.

We encountered 7 instances in which the deduction seemed reasonable that a certain patient had been infected by another during a restricted period of contact. These details are shown in Table III, from which it may be inferred that the infectious period varied from 8 days before onset of symptoms to 11 days afterward. We had of course other probable instances of infection being contracted by exposure to another case (Table II), but for various reasons, the details did not allow of incorporation of the incident in Table III, chiefly because contact occurred on repeated occasions.

TABLE III.

OBSERVATIONS ON THE INFECTIOUS AND INCUBATION PERIODS

Source of infection	*Relationship of period of contact to illness of the source of infection*	*Patient infected by contact with source of infection*	*Incubation period in patient infected*
Mrs. R.	during 3 days of illness	R.B.	7 to 10 days
R.H.	during the 3 days before onset of symptoms	M.S.	12 to 15 days
R.P.	5 days or more after onset	I.A.	18 days or less
R.P.	5 days or more after onset	P.C.	19 days or less
L.B.	on the 11th day after onset	R.G.	16 days
L.B.	on the 11th day after onset	A.A.	21 days
R.G.	on the 8th day before onset	G.F.	10 days

The infection of G.F. by R.G. is of particular interest; a similar instance has been recorded where a boy in the incubation period infected 7 contacts.[12]

As regards the incubation period, Casey has shown that this may vary from 5 to 35 days, with an average of 12 days.[10] For the incidents shown in Table III, the incubation ranged from about 7 to 21 days.

RESULT OF SCHOOL STUDY

We had 3 instances where children attended school at a time when they were presumably infectious, a few days before the onset of illness. The contacts of these children, studying in the same classrooms, numbered 112; all were questioned on two occasions, covering at least a month from the period of infectiousness of the primary case.

B.M. (Orangeville outbreak) attended school from September 7 to 13, the day he developed

non-paralytic poliomyelitis, and he returned to school on September 20. Questioning his 38 classmates on September 29 and October 22, brought to light only the minor illness of P.Cl. The stools of 26 other contacts were also collected about September 29, and inoculated in 4 monkeys in pools; no animal contracted poliomyelitis.

R.G. (Glen Cross outbreak) attended a one-roomed school until she became sick with spinal poliomyelitis on September 27. Her 14 classmates were examined on October 14 and November 9, and in this way the illness of A.A. was learned of; however, it is more likely that R.G. and A.A. were infected by prolonged contact at home with the child L.B. (see Table II).

H.C. (Camilla outbreak) was at school until November 6, and 2 days later developed non-paralytic poliomyelitis, and was confined to bed. Of the 60 contacts questioned on November 23 and December 7, five had vague complaints such as nausea, headache, or fatigue; but no virus was detected in their pooled stools on monkey inoculation.

Thus only two of the 112 school contacts appear to have developed clinical poliomyelitis, and one of these was probably infected outside school.

STUDY OF FAMILY MEMBERS

Enquiries were made concerning the health of family members in the 4 week period before and after the onset of illness in the primary case in the household. Having regard to the fact that cases of poliomyelitis are infectious for about a week before and after the onset of symptoms, and that the incubation is seldom over 3 weeks, it is considered likely that secondary cases should sicken within 4 weeks of the date of onset of symptoms in the primary case. However, as exemplified in our Glen Cross outbreak, it may be difficult to separate with certainty, in a given group of presumably related cases, primary and secondary infections.[7] In point of fact, in our series it appears relatively easy tentatively to assign familial cases to the primary or secondary group. In three instances, 2 cases occurred in a family within 5 days (Mr. and Mrs. K., D.V. and R.P., H.C. and F.C.), and it has been considered that each pair was probably infected from a common source; accordingly, these patients have all been regarded as primary cases (see Table IV).

The details of the incidence of poliomyelitis in the 52 adult and 55 child family contacts of 25 primary cases occurring in 22 households are shown in the Table. For interest, other illnesses occurring in the contacts are also listed. There were only 3 secondary cases of poliomyelitis among the 107 contacts (all in the 55 children), giving a secondary attack rate of 2.8% in family members of cases of poliomyelitis. If the possibility is considered that Mr. K., R.P., and F.C. were really secondary cases, then the secondary attack rate rises to 5.5%. One family had 3 cases, 4 families had 2 cases, and 17 families had a single case.

DISCUSSION

This investigation has been planned in an endeavour to study the behaviour of the disease poliomyelitis in a largely rural community, where human contacts are more restricted than is the case in urban centres. It is hoped that it may be possible to continue these investigations for some years and, if this is possible, the study will be unique.

The area selected, Dufferin County, Ont., containing 14,000 people, is small enough to investigate every suspected case of the disease ill enough to require medical attention. Furthermore, by continuation and expansion of the present program of school clinics, a large number of "subclinical" or "minor illness" cases will be uncovered. The study is being conducted during the winter as well as the epidemic season, and a report on this aspect of the work will be issued in due course.

During the summer and fall of the first year of the study, 1948, 28 suspected cases of poliomyelitis were discovered by the joint efforts of the local physicians, the health officer, and the special field worker. It is probable that, in the normal course of events, at the most 12 of these cases would have been reported to the Provincial Health Department. Evidently, therefore, a considerable number of cases of poliomyelitis are not officially reported.

Investigation of the probable source of infection of these patients revealed that in many instances there was a history of close contact with a previous victim in the infectious period. This history was given by 16 of the 28 patients, and in the Orangeville and Glen Cross outbreaks by 15 out of 21 patients.

It is, of course, impossible to prove that one person infects another during a period of close

TABLE IV.

INCIDENCE OF POLIOMYELITIS IN FAMILY CONTACTS (DUFFERIN COUNTY, 1948)

	Primary case or cases in family			*Numbers of family members, excluding primary case, in age groups*					*Secondary case or cases in family*			*Incidence of illnesses other than poliomyelitis in family members*
	Initials	*Age*	*Date of onset*	*0–4*	*5–9*	*10–14*	*15–19*	*20 and over*	*Initials*	*Age*	*Date of onset*	
Orangeville	M.R.	Adult	June 29	1 (M.R.)	1 (R.R.)			1	M.R. R.R.	4 5½	July 12 July 23	
	R.B.	5	July 8	1	2	1		3				2 with measles; 1 with lymphadenitis
	M.H.	4½	July 13	1	3	1		3				1 with measles
	D.M.	6	July 13	3	2			2				
	R.H.	8	July 29	2	3			2				2 with lymphadenitis
	S.C.	4	August 4		2			3				
	M.S.	8	August 8	1				2				
	D.V. R.P.	3 15	August 13 August 17		2			2				
	Mrs. K. Mr. K.	Adult Adult	August 14 August 15	3				2				2 with vomiting
	I.A.	10	September 9	1			1	4				6 with diarrhœa
	P.C.	10	September 10 and 18	1	1			2				1 with chickenpox
	B.M.	7	September 13			1	1	2				
	P.Cl.	6	September 17 and 28	1	1			3				
Glen Cross	L.B.	15	August 31					2				
	R.G.	10	September 27	3	1			3				
	G.F.	2½	September 29					4				
	A.A.	15	October 2			1	1	2				all 4 had abdominal pain and vomiting
Camilla	E.M.	8	July 20	1			2	2				
	J.H.	8	September 7 and 13	1		1		2				
	B.F.	8	September 13		1			2				
	H.C.	16	November 3 and 8									
	F.C.	4	November 9		1	2	1	2				
	M.D.	11	November 9			1 (B.D.)	1	2	B.D.	13	December 4	
Totals	25			20	20	8	7					
						55		52	3 (2.8%)			19

contact, yet from consideration of our evidence it appears highly likely that the virus was so transmitted. Consideration of certain incidents where the contact was relatively restricted, suggests that the period of infectiousness in poliomyelitis is somewhat longer than has been claimed by others, from 8 days before to 11 days after the onset of symptoms. We did not obtain evidence that cases remained infectious far into the period of convalescence.

In this outbreak, children were mainly concerned, although the Orangeville outbreak appears to have been initiated by an adult. Our studies emphasize the important part played in dissemination of infection by children suffering from the milder and usually ambulant varieties of the disease. Failure to recognize that such patients are active disseminators of infection probably explains why many field investigators have failed to obtain evidence of direct association between patients in more than a few instances.

We feel that poliomyelitis was the most probable diagnosis in the 16 cases of minor illness described in this report, for three reasons: positive virus recovery in 2 instances; resemblance of the clinical features to those found in the pre-paralytic phase of the paralytic illness; and suggestive evidence that patients with such symptoms infected others who developed the severe non-paralytic or paralytic varieties of poliomyelitis. If poliomyelitis is indeed spread by children suffering from mild illnesses, and if the period of infectiousness extends far into the pre-symptomatic period, the question of control (except by vaccination) appears to be incapable of solution.

Another point worthy of discussion concerns the ease of recovery of virus from the different clinical varieties of poliomyelitis. Excluding consideration of the positive pool of several stools, virus was recovered from all 4 of our paralytic cases, but from only 3 out of 12 patients suffering from the milder forms. This failure to recover virus from more than about a quarter of the milder cases confirms our experience in Toronto in 1947.[2] There are two main possibilities, either that in the milder forms of the disease virus is not often excreted in the stool in amounts large enough to infect monkeys, or that some virus other than poliomyelitis is frequently responsible. From consideration of the evidence now available to us, it appears more reasonable to support the former view.

The evident infectiousness of those suffering from the milder types of illness raises the possibility that mucous droplets of pharyngeal secretion rather than particles of fæcal matter are the actual vehicles of transfer of the virus.

It is probably unwise to generalize as to how far the results of our study in rural Ontario are applicable to outbreaks in other countries, where the disease patterns may differ. Nevertheless, we support the concept that the basic method of spread of poliomyelitis is by close association between cases, and that children suffering from the less obvious forms of the disease play a major rôle. It is probable that superimposed on this basic mode of dissemination, there may be transfer of virus by bulk contamination of food, milk, or water; flies may well play some part in "fanning the flames" of an outbreak already under way. The rôle of symptomless carriers, probably mostly close contacts of cases, is obscure, but it seems that these persons usually play little part in disseminating infection.

Many facts brought out in our study suggest that the actual transfer of virus and its subsequent implantation in the body of the new host is only part of the picture in the pathogenesis of poliomyelitis. While there is no particular difficulty in explaining how the virus is transferred from person to person, very little is known about the factors that encourage the virus to spread to the central nervous system from the portal of entry in the nose, pharynx, or intestine, or that influence the severity of its attack on nerve cells. It would appear that the most logical line for further work involves study of the host rather than the parasite. It is probable that the susceptibility of the host and not the strain of virus determines the outcome of implantation of the parasite in the body.

SUMMARY

1. A combined field and laboratory investigation into the behaviour of poliomyelitis is being carried out in the farming area of Dufferin County, Ont., with a population of 14,000.

2. During the summer and fall of 1948, the first year of the study, 28 probable cases were investigated.

3. Only 4 of these patients were paralyzed, 8 had the non-paralytic form, and the re-

mainder (16) had the minor illness type of poliomyelitis, not even being confined to bed. There were 4 examples of dromedary illnesses, and in 3 of these, the second period took the form of a minor illness.

4. Laboratory confirmation of the clinical diagnosis of poliomyelitis was sought by monkey inoculation of stool extracts. Poliomyelitis virus was isolated from 7 out of 16 cases where stools were collected within 3 weeks of the date of onset of symptoms; one pool of 4 additional stools also proved positive for poliomyelitis virus. Two of the isolations of virus were from the stools of cases of minor illness. Serological tests did not suggest the prevalence of infections likely to be mistaken for poliomyelitis.

5. In every case, careful enquiries were made to trace the possible source of infection, and the findings suggested that the disease was chiefly spread by close contact between children. In most instances, patients gave a history of playing with another case, and having prolonged contact.

6. The infectious period extended from 8 days before the onset of symptoms to 11 days thereafter.

7. The child suffering from a minor illness plays a most important rôle in the spread of poliomyelitis.

8. The incidence of clinical poliomyelitis in the families of 25 primary cases was investigated. None of the 52 adults became sick, and only 3 of the 55 children; this gives a secondary attack rate of 2.8% in family members.

9. In three instances, children attended school in the infectious period immediately before the onset of symptoms. Of the total 112 contacts exposed to these cases, probably only 1 developed clinical poliomyelitis.

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IMPROVED RESULTS IN PERFORATED PEPTIC ULCER*

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THE results of the surgical treatment of perforated peptic ulcer have shown a remarkable improvement during recent years. Prior to about 1942 the average mortality in reported series of cases was roughly 25% as shown in Table I.

TABLE I.

MORTALITY IN PERFORATED PEPTIC ULCER PRIOR TO 1942

Series	*Year*	*% Mortality*
Fallis	1938	20.0
Eliason and Thipgen	1938	21.4
Thompson	1939	28.0
De Bakey and Odom	1940	17.3
Offelden and Allen	1942	26.0

More recently many series of cases have been reported which show a striking improvement in mortality as seen in Table II.

TABLE II.

MORTALITY IN RECENT SERIES

Series	*Year*	*% Mortality*
McLure	1940	7.7
Estes and Bennett	1944	8.7
Graham and Tovee	1945	6.3
Hamilton General Hospital	1947	7.7
Baritell	1948	1.1

An analysis of the cases at the Hamilton General Hospital during the past twelve years, also records a very gratifying improvement during the last six year period, the mortality having fallen from 18 to 7.9% as shown in Table III.

Unfortunately certain surgical text-books,[1] and even recent articles in current medical

* Read at the Seventy-ninth Annual Meeting of the Canadian Medical Association, Section of Surgery, Toronto, June 25, 1948.

TABLE III.

CASES OF PERFORATED PEPTIC ULCER AT HAMILTON GENERAL HOSPITAL 1934–46

6 year period	*No. of cases*	*% Mortality*
1934 to 39	164	18.0
1940 to 46	113	7.9

literature, ignore these facts and persist in asserting[2] that the surgical treatment of perforated peptic ulcer is associated with a mortality of at least 25%. This statement is unwarranted and is based upon the results of a by-gone era. It is totally inaccurate and misleading to stigmatize the modern surgical treatment of perforated peptic ulcer by attributing to it a mortality of 25%. With modern methods of surgical management any such mortality is not only unnecessary, but unjustifiable.

However, as an occasional isolated series of cases is still being reported with an excessive mortality, it would appear desirable to analyze our results, with the object of determining the lethal factors, and to consider methods of eliminating these. It is also important to ascertain those factors which have contributed to the recent improvement in our results, in order that these methods may be incorporated in our management of these cases.

Undoubtedly the most important factor in increasing the mortality in perforated peptic ulcer is delay in carrying out surgical treatment. This fact is so well established and generally accepted, as to require little elaboration. Table IV shows that the mortality among cases operated upon during the second six-hour period is more than double, and after

TABLE IV.

MORTALITY AND TIME BEFORE OPERATION

	% Mortality in six-hour periods		
Reported series	*0–6 hrs.*	*6–12 hrs.*	*12–18 hrs.*
Estes and Bennett	0	11.7	
Baritell	0	0	7
C. R. Stanley	6.5	14.6	
Sallick	2.0	15.0	30
Williams and Walsh	10.4	23.0	50

twelve hours is more than treble, that of those operated upon during the first six hours.

However there are still too many late cases. Even recent series of cases show that roughly 20% still do not come to operation until after twenty-four hours.

This delay is probably attributable to certain diagnostic difficulties encountered in these cases. The typical picture of perforated peptic ulcer with its dramatically sudden onset, severe pain and marked rigidity, is unmistakable. However this characteristic picture is not always present, being absent in about 20% of cases. There is also an absence of any ulcer history in approximately 25% of cases.[3]

In certain cases the exudate appears to trickle down the right paracolic gutter to the right iliac fossa and pelvis, with little irritation of the anterior parietal peritoneum. There may be relative absence of rigidity and little tenderness in the upper abdomen. The point of maximum tenderness may be in the right iliac fossa simulating an acute appendicitis. In some of these cases there may be little abdominal tenderness anywhere, but marked tenderness on rectal examination, which procedure should never be omitted. Unless these atypical syndromes are borne in mind the diagnosis may be missed.

The elderly group of patients also appear to present special diagnostic difficulties. In the Hamilton General Hospital series, too many of these older patients failed to arrive in hospital until 24 hours after perforation. In some instances there was delay in calling a physician. The pain mechanism appears to be dulled in the aged and the patient tolerates his pain longer than the younger person.

The reflex mechanism is also less active and there is less rigidity and tenderness than in younger individuals, so that even after the physician has been called, he may have difficulty in appreciating the seriousness of the condition, with resulting further delay. We must be prepared to diagnose perforation in the aged in the presence of less marked signs and symptoms than in other individuals.

Then again if the patient is not seen until several hours after perforation, the stage of reaction will have set in with its deceptive improvement. The patient looks and feels better, the pain has moderated, and the pulse is rarely over 90 per minute. The rigidity however persists and should be sufficient to give the clue to the diagnosis in spite of the confusing moderation of symptoms.

The pernicious practice of administering morphine before the diagnosis is made is more prevalent in connection with perforated ulcer than in other acute abdominal lesions, probably because of the severity of the initial pain. Too

often the patient arrives in hospital sleeping peacefully after having had several one-half grain doses of morphine. Again the persistence of the rigidity in spite of the abolition of the pain, offers the key to the solution of the problem.

The remedy for this delay due to diagnostic difficulty is to make the profession more conscious of the variations in the clinical picture so frequently present.

If serious doubt regarding the diagnosis exists, the patient should be hospitalized, and flat x-ray plates taken in the upright, and left lateral or horizontal position. A bubble of free air under the right or occasionally the left, dome of the diaphragm, or beneath the right parietes in the horizontal position, will confirm the diagnosis, as it is pathognomonic of perforation. It is present in from 58 to 89% of cases according to various observers.[4, 5] Its absence however does not exclude perforation. There will be the occasional case where the evidence obtainable, while pointing to a serious abdominal lesion, will be insufficient to enable a diagnosis of perforation to be made, and the diagnosis will only be made at laparotomy. It is much safer to resort to exploratory laparotomy than to procrastinate in such cases.

Age, in our series, and many others was found to be an important determining factor in mortality. The death rate was over five times as high in patients over 50 years of age as among those under 50 years as seen in Table V.

TABLE V.
AGE AND MORTALITY

Series	*Under 50 yrs.*	*Over 50 yrs.*
	%	%
Paletta and Hill	6.7	41
Hamilton General Hospital	3.6	16

Undoubtedly the diagnostic difficulties peculiar to the aged, mentioned above, are a contributing factor to this mortality. Furthermore two of the important causes of death in perforated ulcer, namely pneumonia and embolism are more prevalent postoperative complications among the older group of patients. Delayed healing and wound disruption also occurred occasionally. While the surgeon can do nothing to alter the age of his patients he can do much to adapt his treatment to their requirements. The operative procedure should be the minimum one, namely simple closure. Intercostal and local anæsthesia will be adequate in bad risk cases. These and all those with recent respiratory infections should be placed in an oxygen tent after operation.

Bed exercises, deep breathing and frequent changes in posture are insisted upon immediately after operation and these patients are encouraged to get out of bed as soon as possible, usually about the third day after operation. They are started on walking with assistance and not allowed to sit for long periods without exercise. The more frequent application of early ambulation in recently reported series has been an important factor in reducing the mortality among these elderly patients.

The quantity of the exudate present in the peritoneal cavity bears a direct relationship to the mortality. In the Hamilton General Hospital series, a large quantity of exudate was reported in 28 cases and seven of our deaths, or 77% of the deaths, occurred in this group.[9] The mortality rate among these 28 cases with profuse exudate was 25%, as compared with 2.3% among the remainder. This is too striking a relationship to be ignored.

The quantity of exudate present is dependent upon several factors, the quantity of food in the stomach at the time of perforation, and the size and site of the perforation. It has long been known that the death rate is higher among patients who perforated upon a full stomach. This has been proved experimentally by Bergh, Bowers and Wangensteen,[6] who have shown that if the stomach of dogs was incised while containing food the mortality was 86.7%, but if the incision was made while the stomach was empty the mortality was only 6.9%.

The usual explanation of this relationship between spilled exudate and mortality has been based upon the development of peritonitis. Blalock has shown experimentally that after the intraperitoneal injection of gastric juice, bile and pancreatic juice, a chemical peritonitis results.[7] There is immediate and intense irritation of the peritoneum, accompanied by pain, and frequently shock. This primary chemical peritonitis may of course prepare the soil for infection later.

However, while infective peritonitis does undoubtedly occur in later cases, the frequency with which negative cultures are obtained at

operation, makes one doubt that this is the principal lethal factor. Graham and Tovee obtained negative cultures in 58% of the cases cultured.[8] This has caused the writer to speculate as to what other factors might be responsible for the prostration and death in so many of these cases. The possibility of toxæmia due to absorption from the partially digested stomach contents was considered.

A preliminary investigation was carried out in connection with two of the substances commonly present in partially digested stomach contents, namely, peptone and histamine.* Peptone is known to be extremely toxic on intravenous injection. Intraperitoneal injections of peptone in dogs and guinea pigs were carried out, with no perceptible effect, even after exceeding the lethal intravenous dose. On intravenous injection into the same animals an immediate fall in blood pressure, increase in pulse rate and change in respirations occurred. Peptone had to be discarded as the source of toxæmia.

Histamine, known to be present in meat and other foods in large amounts, was next investigated. An immediate and marked effect was noted upon the intraperitoneal injection of a solution of histamine. If sufficient were injected death occurred with bronchospasm. Thus histamine appeared to be a possible source of toxæmia in perforated ulcer. This work is incomplete and requires much further investigation, but the findings appear significant.

These clinical and experimental findings indicate the importance of minimizing the amount of spilling of stomach contents, intraperitoneally. This principle is carried to the ultimate extreme by the exponents of the conservative treatment of perforated peptic ulcer. By the use of gastric aspiration and suction drainage through a Levine tube further leakage is prevented and the patient is said to be able to deal with a minimal amount of spilling which may have occurred prior to commencing the treatment. The advocates of this conservative method of treatment stress that it must be used only in early cases and report a mortality of 11.3%. As this mortality is treble that now obtainable[2] by early operation during the first six hours and higher than the gross mortality in most recently reported series treated by operation, there seems little argument to support conservative treatment. Of course this method was adopted because of the former high mortality of 25% previously associated with the surgical treatment of perforated peptic ulcer. As this mortality no longer prevails it cannot be used as an argument in favour of conservative treatment. While we know that some cases with minimal leakage recover spontaneously, with a rapid disappearance of signs and symptoms in a few hours, the risk of adopting any policy of delay or non-operative treatment is too great. I feel that conservative treatment with very rare exceptions, cannot be condemned too strongly. The advocacy of this policy is too apt to cause confusion and misconception and nullify our efforts to secure earlier surgical treatment for these patients.

However the advocates of conservative treatment have performed the service of emphasizing the value of suction drainage and its consequent minimizing of intraperitoneal leakage. A Levine tube should be introduced as soon as the diagnosis is made, and the gastric contents aspirated. Continuous suction drainage should be commenced and continued for several days after operation. The increased use of suction drainage in this way as an adjunct to early surgical treatment in recent series of cases reporting lower mortality, is probably an important factor in these improved results and it should be used routinely.

Chemotherapy undoubtedly has a place in the treatment of the late case and those with large amounts of spilling. While peritonitis is not as important a factor during the early stages as was believed, it undoubtedly does develop in the later stages as shown by the percentage of positive cultures. Consequently the use of chemotherapy is rational procedure in the later cases. The local use of the sulfonamides is restricted by the writer to those cases in which purulent exudate is found at operation. Drainage is rarely used unless a localized abscess is present. It is the writer's practice to use penicillin in every late case and on the first sign of any pulmonary involvement. If this is not effective as indicated by the temperature, white blood cells, distension, etc., soluthiazole is added intramuscularly. These measures are helpful where definite infection is present. Many of those recently reporting excellent results including Baritell and others

* I wish to acknowledge the collaboration of Drs. Haist and Waters in the Department of Physiology at the University of Toronto in this work.

employ intravenous sulfonamides before and after operation routinely.[9] In certain late cases with frank pelvic or subphrenic abscess streptomycin promises to be of value as indicated by recent reports. Morton[10] claims excellent results from its use intraperitoneally. Without doubt some of the improvement in recent series of cases is attributable to the use of chemotherapy, which controls the infection in many of the later cases. Streptomycin will probably aid in further lowering of the mortality in these cases.

The general condition of the patient has an important bearing upon the prognosis in the surgical treatment of perforated peptic ulcer. The patient who has been vomiting for hours before operation is suffering from dehydration and chloride deficiency. An intravenous of glucose in saline will correct this and is commenced routinely in our cases immediately upon admission. In the presence of severe dehydration operation may better be deferred for an hour or two. Many patients have also suffered from gross or occult bleeding prior to perforation and present varying degrees of anæmia. This group should have a blood transfusion during operation.

A deficiency more frequently overlooked is the chronic malnutrition so often present in these cases. As the result of prolonged restriction of diet and vomiting due to partial pyloric obstruction, marked nutritional changes are often present. The criterion which we adopted to estimate this was weight loss. In the Hamilton General Hospital series among those persons who died, 30% gave a history of marked loss of weight. Seven patients stated that they had lost a great deal of weight varying from 20 to 40 lb. and among these there were three deaths or a mortality of 42%. A blood transfusion given during operation will provide some quickly available protein, and fortify these patients against the shock of the procedure. Postoperatively 1,000 c.c. amino-acids are administered daily until food by mouth can be taken.

The recognition and correction of these systemic deficiencies during recent years has been another important factor in improving results.

There is no longer much argument about the type of operation which should be employed. It is generally agreed that the simplest procedure compatible with saving life is indicated, namely, simple closure. The closure is effected by the suturing over the area a free graft of omentum or if sufficient omentum is available adjacent to the perforation this is sutured across it. Because of induration and friability of the tissue it is rarely possible to use a satisfactory infolding method by purse-string or mattress sutures. Exudate is carefully aspirated. Drainage is rarely employed and only if localized abscess is present. Sulfonamides are occasionally used intraperitoneally in late cases if the fluid appears purulent.

In the Hamilton General Hospital series, simple closure was used in all but two cases, in one of which gastroenterostomy was added, and in another very early case with minimal exudate where resection was carried out. While both cases recovered, these added procedures are not recommended.

The factors essential for improved results in the surgical treatment of perforated peptic ulcer have been discussed and are summarized in Table VI.

TABLE VI.

ESSENTIALS IN SURGICAL MANAGEMENT OF PERFORATED PEPTIC ULCER

1. Early operation.
2. Immediate suction drainage.
3. Intravenous administration of water, salt, blood, amino-acids.
4. Chemotherapy.
5. Early ambulation.

The most essential of these is early operation which is a *sine qua non* if further lowering of mortality is to be realized. To achieve this, more effective and intensive postgraduate teaching is necessary to familiarize the profession with the perplexing diagnostic problems so often present, and with methods for their solution.

With the attainment of early operation and the more universal application of the other methods mentioned, we may confidently expect still more spectacular improvement in the results of the surgical treatment of perforated peptic ulcer.

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RESUSCITATION OF THE SURGICAL PATIENT*

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NO event in surgery is more dramatic than the resuscitation of an apparently dead patient. Such episodes are infrequent, but the need arises several times a year in the average clinic, and, unless treatment is prompt and effective an unnecessary fatality occurs. There is no emergency that demands faster action. Team-work is essential and the necessary equipment must be instantly available. Anæsthetists and surgeons should all be trained in resuscitative measures so that when a crisis occurs it may be handled quickly and efficiently.

In order to appreciate the problems involved in resuscitation we must consider the causes of sudden collapse in the operating room. These fall into three groups.

1. *Sudden decrease in the circulating blood volume.*—(*a*) Shock. (*b*) Hæmorrhage.
2. *Cardiac arrest.*—(*a*) Cessation of the heart beat. (*b*) Ventricular fibrillation.
3. *Respiratory failure.*—(*a*) Central depression. (*b*) Blocking of the airway. (*c*) Collapse of the lungs.

Practically all cases of sudden operative death fall into one of these groups. The recognition of this fact allows the surgeon and anæsthetist to take precautions which may prevent a fatality. (1) Proper selection of cases and adequate preoperative care will reduce the number of bad-risk patients coming to operation. (2) Gentle surgery avoids shock and excess blood loss. In any major procedure adequate blood replacement is esential. It is much easier to prevent shock than to treat it in the decompensated stage. (3) An adequate airway must always be maintained and the oxygenation of the blood should be kept at a high level. A new development which permits very accurate knowledge of the degree of oxygenation is the photo-electric cell oximeter. This instrument enables the anæsthetist to detect impaired oxygenation long before cyanosis or other clinical manifestations become obvious.

In brief, prophylaxis of sudden collapse demands constant alertness on the part of both surgeon and anæsthetist. Warning signs must be noted and acted upon at once.

Despite the greatest care the unexpected does occur, and lives are lost due to delay or ignorance in applying resuscitative measures in cases of collapse. The purpose of this paper is to outline an efficient plan of action in dealing with such cases.

Thompson and Rockey have stated that the two principal functions of resuscitation are oxygenation of the blood and the circulation of this oxygenated blood to the vital centres. To this a third function should be added, the maintenance of an adequate effective blood volume. The problem thus resolves itself into the following factors. (1) Maintenance of oxygenation by artificial respiration. (2) Restoration of cardiac action. (3) Restoration of the blood volume.

Artificial respiration.—When breathing stops, the impulse of the untrained observer is to apply some form of artificial respiration. Such a measure may be heroic, but it does no good if the airway is blocked. The first move should be to pass an intratracheal tube, thus establishing a clear respiratory passage and ensuring that delivered oxygen reaches the lungs. The next essential is to inflate and deflate the lungs by mechanical means. The time-honoured techniques of artificial respiration devised by Shafer and others have no place in the modern operating room. They contaminate the surgical field and add to shock by traumatizing the patient. In addition, it has been shown experimentally that none of these methods produce an adequate degree of pulmonary ventilation.

Manual inflation of the lungs may be produced by the anæsthetist with a breathing bag. This suffices for most ordinary cases but it is inefficient and cannot be controlled accurately for long periods of time. The ideal means of artificial respiration is by the use of a mechanical resuscitator which delivers pure oxygen at a positive pressure of plus 14 mm. of mercury and a negative pressure of minus 9 mm. of mercury. Such a method not only produces a rhythmic inflation and deflation of the lungs but also has a definite effect upon the movement of the blood independent of the heart beat. The circulatory effect of artificial respiration is not great enough to maintain blood flow when the heart has stopped, but it prevents stagnation in the vessels and prolongs

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the period which an animal can survive cardiac arrest.

Restoration of the heart beat.—Cardiac arrest in the surgical patient may be due to cardiac standstill or to ventricular fibrillation. The differential diagnosis is of vital importance because the treatment differs in the two conditions. The diagnosis is often difficult and requires confirmation by an electrocardiographic tracing. If the heart can be palpated or visualized the condition of ventricular fibrillation can be recognized by the uncoordinated twitching of the ventricular muscle.

The treatment of cardiac standstill involves stimulating the myocardium with adrenalin and cardiac massage. The latter procedure is of value in two ways. First, it enables the operator to force blood from the heart into the great vessels, and this, with the effect of artificial respiration gives enough circulation to the brain, and other vital organs to keep the patient alive until co-ordinated heart action is resumed. Second, massage provides a good irritative stimulus to the myocardium which will often initiate the beat.

The proper technique of cardiac massage is a controversial matter. Manipulation through the diaphragm is of little value and cannot be used to maintain circulation for any time. If the abdomen is open when the heart stops, the left side of the diaphragm should be incised and the hand introduced into the thoracic cavity. The heart is palmed and rhythmic compression and relaxation begun. The heart is compressed from the apex to the base in order to expel blood through the aortic orifice. If the abdomen is not already open a transthoracic approach is preferable because the heart can be visualized and observed more accurately. An intercostal incision in the 5th left interspace allows rapid exposure. The technique of cardiac massage should be learned by all surgeons. If it is effectively done the radial, femoral and carotid pulses become palpable and circulation can be maintained for an indefinite period.

Two other methods are available which aid in maintaining an effective blood flow during cardiac arrest. Heparin is of value in preventing thrombosis and keeping the blood fluid, and the tilt table has proved to be an effective method of aiding circulation.

The use of adrenalin in cardiac arrest has been much abused in the past. It is a very valuable drug in cases where the heart has stopped, but it is dangerous in too large a dosage because it may precipitate ventricular fibrillation. The dose should not exceed 1 c.c. of the 1:1,000 solution and should be given into the right auricle. In the presence of fibrillation its use is contraindicated because it increases the irritability of the myocardium and makes a bad situation worse.

Ventricular fibrillation can no longer be considered a hopeless condition. Cases have been reported by Beck and by Lampson in which the human heart has been successfully defibrillated. These experiences confirm the experimental work of Beck, Fauteux and others. The technique of treatment is now well established and many more successful cases will undoubtedly be reported in the future. The first requisite is cardiac massage and artificial respiration to maintain an adequate circulation of oxygenated blood. The next step is the restoration of a co-ordinated heart beat.

Procaine hydrochloride in dosage of 5 to 10 c.c. of a 1% solution should be given intravenously or directly into the right auricle. In some cases, this alone will cause a co-ordinated action of the ventricles. In most instances, a second dose is necessary followed by electrical stimulation. This is done by using ordinary 110 volt alternating current with 1.5 amperes. An electrode is placed on either side of the heart and the current turned on for 1 or 2 seconds. The effect is a simultaneous contraction of all the heart muscle fibres. This results in cardiac standstill which is followed by a regular co-ordinated rhythm. Several shocks may be necessary before this is attained.

The human heart has been successfully defibrillated several times but only twice with complete recovery of the patient. The time element is important, because if a state of cardiac standstill is allowed to persist for longer than three to four minutes irreversible brain damage occurs. Other vital organs such as the liver, kidneys and heart itself also suffer from prolonged anoxia. It is obvious that if these resuscitative measures are to be of value they must be applied without delay.

Restoration of blood volume.—One of the causes of sudden collapse in the operating room is massive hæmorrhage with depletion of

the circulating blood volume. The profound fall in blood pressure which results may lead to a critical loss of flow in such vital organs as the brain, liver, and kidneys. In many cases, analeptic drugs do not produce any response and if the loss is severe and uncompensated a point is soon reached where intravenous replacement is ineffective. The reason is that the blood pools in the veins and in the right heart producing congestion and pulmonary engorgement but contributing little or nothing to the arterial flow.

The use of intra-arterial transfusion has recently been advocated in such situations. The rationale of the precedure is to introduce blood into the arterial tree in a central direction and thus restore the blood volume quickly. Oxygenated blood is transfused into the radial artery under pressure at a rate of 150 to 200 c.c. per minute. This fills the arteries and capillaries of the brain and other vital organs and avoids pooling on the venous side of the circulation. The coronary vessels are also filled and the heart action is improved. Patients in severe shock from operative or postoperative hæmorrhage have been successfully resuscitated by this method when intravenous transfusion has been ineffective. There is no doubt that this can be a life-saving measure but the apparatus must be available and the blood volume restored without delay. In two recent cases we have resuscitated patients after a prolonged period of hypotension only to see them die from cerebral damage within two days. Intra-arterial transfusion should only be used in critical situations but when it is obvious that the situation is critical there should be no further delay. The chief dangers of the method are air embolism and the production of gangrene of the hand. The former can be obviated by a new type of apparatus which is being developed at the Royal Victoria Hospital, Montreal. The latter has never occurred in our experience and can always be avoided by inserting the cannula in the radial artery distal to its superficial volar branch.

CONCLUSIONS

From this outline it is apparent that we have effective means of resuscitation available. The necessary equipment should be in every operating room and a routine planned for dealing with emergencies. It is only by rehearsed, orderly action that the vital time factor can be overcome in these cases.

As soon as it becomes obvious that heart action or respiration has ceased the resuscitation plan should spring into action.

1. The anæsthetist passes an intratracheal tube and connects it with the resuscitator to provide artificial respiration. Analeptic drugs can be given at this time.

2. One of the nurses is detailed to call off the minutes and if cardiac action has not begun in two minutes the heart is exposed and cardiac massage begun. When these two measures are under way the situation is no longer so critical because it is possible to maintain a flow of oxygenated blood to the vital organs. The cause of collapse may then be determined and corrected.

3. If there has been severe blood loss a cut-down is made on the radial artery and intra-arterial transfusion commenced.

4. An electrocardiograph can now be taken. If ventricular fibrillation is present, the treatment with intravenous procaine and electrical shock is carried out. If there is no contraction of the heart muscle, intracardiac adrenalin is given and massage continued.

If these measures are carried out efficiently without delay lives will be saved. The chief difficulty at present is that in most institutions little attention is paid to catastrophe until it happens. The time wasted in looking for equipment and drugs is all too often the difference between life and death. It is only by planned action and co-operation between surgeon and anæsthetist that resuscitation can be fully effective and operating room deaths avoided.

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There are several kinds of power. There is the power of the soldier, based upon fear and upon naked force. There is the power of the policeman, based upon a combination of force and law, of fear and justice. There is the power of the witch-doctor, based upon supernatural sanctions and irrational dreads. There is the power of the propagandist, based upon the skill in arousing and manipulating passions over which man's reasoning mind has no sway. Finally, there is the power of wisdom or truth—the power which considers that the way to lead men is to know where they should go, and to tell them, explaining to them as if they were rational beings why it is the right way. This was the power of Socrates, and his enemies feared it so that they condemned him to death, but this did not end his power. It is the power of every wise teacher. It is also the power of the honest scientist and of the sincere artist or writer. It is the power which Unesco is trying to mobilize for peace through science, education and culture.

Unesco Bulletin

CHANGING CONCEPTS IN PROSTATIC SURGERY*

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IT has recently been suggested that the operation of suprapubic prostatectomy should be abandoned because of its high mortality and morbidity.[1] We feel sure that the authors who made this suggestion have had little experience with the suprapubic procedure which has been evolved during recent years. The era of blind, septic removal of the prostate is nearing an end, and an operation is developing which is done under vision in a sterile field, or in an already infected field to which no new organisms are added.

The results of 520 consecutive two-stage operations from 1937 to 1944 were published by one of us (S.A.M.) in 1947.[2] Those cases were all treated according to the accepted methods of that period. They had preoperative catheter drainage and cystoscopy followed by first-stage cystostomy. Finally they were subjected to a blind second-stage operation and the insertion of a so-called hæmostatic bag of the Pilcher type. The average annual mortality was 7.8% and the preoperative mortality 4.9%. Since then great changes have occurred in the preoperative management of the patient and in the technique of the suprapubic operation.

Preoperative Care

Infection is the chief cause of death in prostatic patients. Despite this urologists as a whole have been careless in observance of asepsis in all phases of the patient's care. A growing reaction to this *laisser-faire* attitude is manifest in recent writings. Aseptic prostatectomy[3] is being described, and urologists are urged to emulate the technique of the brain and joint surgeons. The necessity for this is only too apparent when one realizes that the urine is a fertile culture medium and that dire consequences can follow infection. Rees[4] in two recent series of cases showed that infection was not only the chief cause of death but outnumbered all other causes in the ratio of four to one. The urethral catheter is undoubtedly a contributing factor. Hey[5] has recently stated that the preoperative catheter increases the mortality rate 300%. He refers to rubber tubes, urethral and suprapubic, as highroads of infection.

Preoperatively the most controversial issue at present is urethral instrumentation. In the past most patients were subjected to a period of urethral catheter drainage. This was done in the full knowledge that an in-dwelling catheter invariably meant an infected bladder. A resulting episode of preoperative fever signifying pyelonephritis, was a common occurrence, and even considered beneficial, supposedly enhancing the patient's resistance to his infecting organism. This may have been so, but the patient sometimes died of the newly acquired renal infection or developed progressing uræmia or anuria as a result of the added renal damage. The same consequences sometimes followed preoperative cystoscopy.

Urethral catheter drainage when employed preoperatively should probably not be utilized for more than 72 hours. Within that period it should be possible to appraise completely the patient's condition, determine the operative risk and decide upon the type of operative interference required. If prostatectomy by any route is not thought advisable at the end of this period then a suprapubic drainage catheter or tube should be substituted for the urethral instrument.

In many cases an adequate substitute for preoperative cystoscopy is the excretion urogram. It affords much information concerning not only the kidney but also the bladder. It has been our experience, however, that it is very fallacious to attempt to estimate the size of the prostate by means of cystography, either retrograde or excretion. At the Montreal General Hospital, in the past year 42.6% of all patients subjected to suprapubic prostatic surgery were operated upon without preliminary catheterization: only 30.9% were not cystoscoped. These percentages are too small but will undoubtedly increase. However, they show a trend away from routine preoperative catheterization and cystoscopic study.

The Modern Operation

Since the start of this century two complete cycles of opinion have been experienced concerning the suprapubic operation. The so-called modern one-stage procedure is fundamentally

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the original method of suprapubic removal advocated by Fuller and Freyer. It was quickly supplanted by the two-stage operation. In the early 'thirties there was a limited return to the one-stage method. It waned again, but now is probably being more widely utilized than ever before. Recently published[6] figures from Bellevue Hospital are interesting in showing these trends. In the period 1928 to 1932, one-half of the prostatectomies in that hospital were done by the one-stage method. The resulting mortality was the lowest the institution had ever experienced in a significant number of cases. In the past seven years at Bellevue 86 one-stage cases have been done with two deaths, a mortality rate of 2.3%.

During the past four years at the Montreal General Hospital the one-stage operation has almost completely supplanted the two-stage method. During that period 300 public ward patients with benign prostatic disease have been operated upon by various methods with only five deaths, an operative mortality rate of 1.6%. One hundred and twenty-seven of the above cases had a one-stage suprapubic prostatectomy with one death, a mortality of 0.78%. These were consecutive cases with no selection according to risk or to statistical results.

Table I.

Montreal General Hospital Public Ward
Prostatic Mortality

1937–1944	Average pre- and post-operative mortality	12.6%
1937–1944	Average suprapubic mortality	7.8%
1945–1948	Average pre- and post-operative mortality	2.3%
1945–1948	Average operative mortality	1.6%

In the following table are shown the changes in operative method that have occurred in our hospital in the past four years:

Table II.

Montreal General Hospital Public Ward
Prostatic Operations

	1945	*1946*	*1947*	*1948*
2-Stage suprapubic prostatectomy	68%	15%	1%	2%
1-Stage suprapubic prostatectomy (vertical incision)	15%	34%	11%	0%
1-Stage suprapubic prostatectomy (transverse incision)	0%	13%	39%	50%
Transurethral resection	11%	31%	42%	40%
Perineal prostatectomy	6%	10%	5%	0%
Retropubic prostatectomy	0%	0%	0%	5%

The great reduction (500%) in pre- and post-operative mortality in the past four years is undoubtedly due to more than mere changes in operative approach. Many factors are involved, of which the most important undoubtedly are greater attention to asepsis, the free use of blood transfusion, antibiotics, early ambulation and careful attention to the many small details of treatment which though trivial in themselves are in the aggregate all important.

The adoption of a transverse abdominal incision during the past three years has produced most gratifying results. Exposure has been facilitated so that the prostatic fossa, almost invariably, can be brought under careful inspection. Bleeding points as a result can be ligated or coagulated and all tissue tags carefully removed. Postoperatively much more rapid wound healing has occurred, and it is hoped that ventral herniation will be eliminated. It has been our experience in the past that a considerable number of prostatectomy patients developed incisional hernias, and slowly healing suprapubic fistulæ have not been uncommon. In consecutive series of vertical and transverse incisions the vertical wounds were found to drain three times as long as the transverse ones following the removal of the suprapubic drainage tube. The vertical wounds were dry in an average of 9.3 days, the transverse in 3.1 days after the tube was removed. Almost one-third, 29.6%, of the transverse wounds were dry on the day the tube was removed, or the following day. The average time for complete wound healing in the transverse cases was 11.7 days, for the vertical cases 17.3 days. The very rapid healing of the transverse incision is most important, because due to early ambulation these patients are ready to leave the hospital as soon as their wounds are dry. This means that the average case can be discharged from the hospital on the 12th or 13th postoperative day. Nesbit[7] in a recent review of transurethral cases said the average postoperative stay was 12 days. Thus one of the big arguments always advanced in favour of transurethral resection, namely the shortened period of hospitalization, has been eliminated. Nesbit's average stay for suprapubic cases was 17 days.

In most of our cases a vertical incision in the bladder was used. However, a transverse bladder incision offers some advantages. The normal contraction of the viscus tends to keep

the edges of a transverse wound in apposition and thus healing is facilitated. Moreover, when the opening is made across the fundus the large lower flap facilitates exposure of the prostatic fossa. The flap can be utilized in elevating the bladder, thus bringing the prostatic area more completely into view.

Visualized hæmostasis is an important feature of the modern operation. Larger arteries of which two are usually found can be clamped and ligated. Smaller bleeding points can be caught with forceps and coagulated or simply touched with a coagulating electrode. In this way serious postoperative hæmorrhage can be prevented and the fossa can be made relatively dry before any hæmostatic substance or catheter is inserted. It is important that during this part of the operation the patient's blood pressure be at least at its preoperative level or preferably higher. Otherwise the fossa may seem perfectly dry after the removal of the gland, but later alarming bleeding may occur. A prostatic fossa treated in this manner will seldom give rise to serious postoperative bleeding. Persistent venous oozing will occur for some time, and usually continues for about five days. It seems to be influenced but little by hæmostatic packing or inflatable catheter. None of these devices are essential as shown by Hey's[8] recent series of 565 cases in which the bladder was tightly closed after careful hæmostasis and drainage effected only by means of a straight urethral rubber tube. The mortality rate in his series was 4.3%. In our cases, inflatable catheters, oxycel and gelfoam have all been used with essentially the same results.

SUMMARY

The changing trend in prostatic surgery is described and illustrated by statistics from the public ward service of the Montreal General Hospital. A review of consecutive cases for the past four years shows that four types of prostatic operation have been utilized, namely: suprapubic, transurethral, perineal and retropubic. The first two in almost equal proportion far outnumber the two other methods.

Important technical changes have been the almost routine employment of a one-stage operation in suprapubic cases, the more frequent utilization of transurethral resection, the adoption of a transverse abdominal incision and the diminished use of preoperative instrumentation.

A mortality rate of 1.6% for 300 consecutive cases treated by all types of prostatic surgery is reported. These cases include 127 one-stage suprapubic operations with one death, a mortality rate of 0.78%.

NOTE.—The late Professor Fraser B. Gurd is largely responsible for the frequent employment of transverse abdominal incisions in the Montreal General Hospital.

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TRIAL OF VITAMIN E THERAPY IN DIABETES MELLITUS*

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THE recent medical literature contains several reports of beneficial effects of the use of vitamin E in the treatment of diabetes mellitus. Butturini,[1] Shute and Vogelsang[2, 3, 4] stated that vitamin E, given by mouth or parenterally, lowered the blood sugar and insulin requirements in diabetes. Similar views were presented in April, 1949, by Butturini[5] and Vogelsang[6] at the International Conference on Vitamin E. Williams[7, 8] reported that 10 of 18 diabetics given vitamin E "exhibited general improvement and claimed to feel better but the evidence was considered too intangible to draw conclusions" and suggested that deficiency of vitamin E may be one of the "accountable factors" in muscular pain in diabetes.†

Study of these reports suggested the advisability of conducting further trials of vitamin E therapy in diabetes mellitus. The purpose of this communication is to present our experiences with oral administration of vitamin E and matching placebos to diabetics attending the Diabetic

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† In a personal communication, dated June, 1949, Williams states "I am persuaded now, after three years of careful observation, that vitamin E has no value in the treatment of diabetes mellitus".

Clinic of the Out-patient Department of the Montreal General Hospital. Vitamin E was given as concentrate of mixed tocopherols (Natopherol Abbott) and concentrate of d, alpha-tocopheryl acetate (Natopherol acetate Abbott).* In view of the emphasis placed on alpha-tocopherol as the active component of vitamin E preparations,[2, 3, 4] the concentrate of d, alpha-tocopheryl acetate was used in the major part of our trial.

Outline of Plan of Trial

Fifty-five diabetics were selected for this study; the basis of selection will be described later. Before commencing use of vitamin E or placebos, three or four specimens of urine and blood were collected in the fasting state at intervals of one to two weeks. This preliminary period of 3 to 6 weeks is hereafter designated as the "control period". The 55 cases were then divided into two groups, designated as the vitamin E and placebo groups and containing 35 and 20 cases respectively. Twenty-one of the 35 cases of the vitamin E group were given concentrate of mixed tocopherols. Later, in these 21 cases, this form of vitamin E was replaced by concentrate of d, alpha-tocopheryl acetate. At the same time, administration of the latter concentrate to the remaining 14 cases of the vitamin E group, and placebos to the 20 cases of the placebo group was begun. The period of therapy was therefore divided into two parts. In the first, 21 cases received concentrate of mixed tocopherols. In the second, 35 cases received concentrate of d, alpha-tocopheryl acetate and 20 cases received matching placebos. Throughout the period of therapy, specimens of urine and blood were collected in the fasting state every two to four weeks.

The following tests were done on specimens of urine and blood collected during the trial: qualitative tests for sugar and ketone bodies in urine; quantitative estimations of urobilinogen in urine, sugar and urea nitrogen in whole blood, and cholesterol, bilirubin and tocopherol in plasma.

All cases were seen in the Diabetic Clinic of the Out-patient Department every two to four weeks by one of the authors (A.F.F.) with no knowledge of the respective identities of the vitamin E and placebo groups. All prescriptions bore code names for the preparations concerned, and plasma tocopherol levels were not entered in the Out-patient records. With two exceptions, no changes were made in diet or insulin therapy throughout the control period and period of therapy. The two exceptions, both of which occurred in the vitamin E group during therapy, were: (1) reduction of insulin dosage by 20 units a day in one case with marked fall in food intake associated with onset of severe cardiac failure, and (2) increase of insulin dosage by 10 units a day in one case by a physician who was unaware that the patient was a subject of this trial.

At the end of the trial, each patient was asked if the medication had been of any benefit. No leading questions were used and the questioner did not know the respective identities of the vitamin E and placebo groups.

Biochemical Techniques

Techniques of estimation of blood sugar,[9 to 11] plasma cholesterol,[12, 13] blood urea nitrogen,[14, 15] plasma bilirubin (van den Bergh method)[16, 17] and urinary urobilinogen[18, 19] were those in use in our Clinic for the past twenty years or more. Plasma tocopherol was determined by the method of Quaife and Harris[20] using a simplified hydrogenation technique.[21]

Table I.

Number of Cases, Sex, Age, Insulin Therapy, and Period of Treatment in Diabetic Clinic Prior to Trial—Vitamin E and Placebo Groups.

	Vitamin E group	*Placebo group*
Number of cases		
Male	10	4
Female	25	16
Total	35	20
Age (years)		
Maximum	74	75
Minimum	40	31
Average	59	60
Insulin therapy		
Number of cases receiving insulin	18	6
Insulin dosage maximum	50	50
minimum	15	20
average	32	30
Period of treatment (months)		
Maximum	179	198
Minimum	5	11
Average	68	80

Selection of Cases

Adults only were selected. All cases had been under treatment sufficiently long to become stabilized; the average period of treatment in

* Supplies of Natopherol Abbott, Natopherol acetate Abbott, and matching placebos containing liquid petrolatum were donated for this trial by Abbott Laboratories Limited.

the Diabetic Clinic prior to the trial was more than 5 years in each group. Cases requiring insulin and those receiving no insulin were included in both groups. In all cases, the diabetes was under poor control, as shown by hyperglycæmia, and frequently hypercholesterolæmia, in the fasting state, but variations in the degree of hyperglycæmia were small. Adequately controlled diabetics or those whose degree of control fluctuated markedly were not included. Dietary histories showed that none were following the prescribed diet but there was little variation in food intakes from month to month.

Further detailed information about the cases selected is presented in Tables I and II.

Diabetic Clinic of the Out-patient Department by one of the authors (A.F.F.) with no knowledge of the respective identities of the vitamin E and placebo groups or values of plasma tocopherol. All other data, including results of analyses of blood and urine, were however available to him at every visit of each patient. At the conclusion of the trial he was unable to discover any clue to the identities of the groups. When asked to guess which group received vitamin E, he based his answer on circumstances bearing no relation to observations made on patients. His guess was wrong.

The biochemical data obtained in the control periods and periods of therapy in the

TABLE II.

BIOCHEMICAL DATA COVERING PERIOD FROM FIRST VISIT TO THE DIABETIC CLINIC TO START OF TRIAL—VITAMIN E AND PLACEBO GROUPS.

Test	*Vitamin E group*			*Placebo group*		
	n.	*M.*	*S.D.*	*n.*	*M.*	*S.D.*
Blood sugar	635	212	±69	396	191	±60
Plasma cholesterol	466	213	±55	304	205	±45
Blood urea nitrogen	165	15	±3	107	15	±4
Plasma bilirubin	152	0.22	—	103	0.21	—

Values expressed in mgm. per cent.
n. = Number of tests.
M. = Mean.
S.D. = Standard deviation of sample (distribution of bilirubin values markedly asymmetrical—S.D. not calculated).

TABLE III.

TYPES AND DOSAGES OF VITAMIN E PREPARATIONS AND DURATION OF THERAPY WITH VITAMIN E AND PLACEBOS.

Type of medication	*Dosage-I.U. per day*			*Duration of therapy-days*		
	Mean	*Max.*	*Min.*	*Mean*	*Max.*	*Min.*
Concentrate of mixed tocopherols	278	337	112	45	64	31
Concentrate of d, alpha-tocopheryl acetate	535	900	100	109	146	23
Combined data for two tocopherol concentrates	438	900	100	136	194	53
Placebos	—	—	—	108	146	14

I.U. = International Units.

ADMINISTRATION OF VITAMIN E AND PLACEBOS

Oral administration only was used. A rise of plasma tocopherol occurred at all levels of dosage of vitamin E. Information concerning types and dosages of vitamin E preparations used and duration of vitamin E and placebo therapy are presented in Table III. All dosages are expressed in international units of vitamin E.[22] With the information in Table III, those who so wish can readily convert our dosages into other units.[23]

RESULTS

Study of the protocols of the cases revealed no effect attributable to vitamin E, other than elevation of plasma tocopherol. As stated previously, all cases were followed in the

vitamin E and placebo groups are summarized in Tables IV, V, and VI. For the vitamin E group, effects of therapy with concentrate of mixed tocopherols and concentrate of d, alpha-tocopheryl acetate are first dealt with separately in Tables IV and V and then combined in Table VI. Periods of therapy with placebos and concentrate of d, alpha-tocopheryl acetate were of practically identical length (Table III). Data obtained with these are therefore comparable and are presented together in Table V.

Inspection of Tables IV, V and VI confirms the previous statement that elevation of plasma tocopherol was the only demonstrable effect which could be attributed to vitamin E.

The questioning of patients at the end of the trial showed lessening of fatigue to be the only

TABLE IV.

EFFECTS OF CONCENTRATE OF MIXED TOCOPHEROLS—BIOCHEMICAL DATA

Test	*Period*	*n.*	*M.*	*S.D.*
Blood sugar	Control	72	216	±54
	vitamin E	39	238	±52
Plasma cholesterol	Control	69	233	±63
	vitamin E	38	243	±56
Blood urea nitrogen	Control	71	17	±4
	vitamin E	39	19	±4
Plasma bilirubin	Control	71	0.18	——
	vitamin E	38	0.14	——
Urine urobilinogen	Control	66	1/550	——
	vitamin E	38	1/650	——
Plasma tocopherol	Control	55	1.1	±0.3
	vitamin E	39	2.2	±0.6

Values for blood and plasma expressed in mgm. per cent; urine urobilinogen expressed in terms of dilutions.
n. = Number of tests.
M. = Mean.
S.D. = Standard deviation of sample (distribution of bilirubin and urobilinogen values markedly asymmetrical—S.D. not calculated).

TABLE V.

EFFECTS OF CONCENTRATE OF D, ALPHA-TOCOPHERYL ACETATE AND PLACEBOS—BIOCHEMICAL DATA

	Vitamin E group				*Placebo group*			
Test	*Period*	*n.*	*M.*	*S.D.*	*Period*	*n.*	*M.*	*S.D.*
Blood sugar	Control	117	216	±60	Control	67	212	±67
	vitamin E	181	222	±73	placebo	109	212	±70
Plasma cholesterol	Control	113	243	±60	Control	65	236	±45
	vitamin E	179	241	±50	placebo	110	231	±46
Blood urea nitrogen	Control	115	17	±4	Control	66	18	±4
	vitamin E	184	17	±4	placebo	111	17	±4
Plasma bilirubin	Control	116	0.16	——	Control	66	0.15	——
	vitamin E	175	0.15	——	placebo	111	0.14	——
Urine urobilinogen	Control	104	1/600	——	Control	60	1/500	——
	vitamin E	167	1/800	——	placebo	106	1/800	——
Plasma tocopherol	Control	96	1.2	±0.4	Control	58	1.0	±0.3
	vitamin E	167	2.4	±0.9	placebo	105	1.1	±0.4

Values for blood and plasma expressed in mgm. per cent; urine urobilinogen expressed in terms of dilutions.
n. = Number of tests.
M. = Mean.
S.D. = Standard deviation of sample (distribution of bilirubin and urobilinogen values markedly asymmetrical—S.D. not calculated).

TABLE VI.

EFFECTS OF CONCENTRATES OF MIXED TOCOPHEROLS AND D, ALPHA-TOCOPHERYL ACETATE—BIOCHEMICAL DATA

Test	*Period*	*n.*	*M.*	*S.D.*
Blood sugar	Control	117	216	±60
	vitamin E	220	225	±69
Plasma cholesterol	Control	113	243	±60
	vitamin E	217	241	±51
Blood urea nitrogen	Control	115	17	±4
	vitamin E	223	18	±4
Plasma bilirubin	Control	116	0.16	——
	vitamin E	213	0.15	——
Urine urobilinogen	Control	104	1/600	——
	vitamin E	205	1/800	——
Plasma tocopherol	Control	96	1.2	±0.4
	vitamin E	206	2.4	±0.8

Values for blood and plasma expressed in mgm. per cent; urine urobilinogen expressed in terms of dilutions.
n. = Number of tests.
M. = Mean.
S.D. = Standard deviation of sample (distribution of bilirubin and urobilinogen values markedly asymmetrical—S.D. not calculated).

subjective change which occurred often enough to be regarded as significant. Comparison of the vitamin E and placebo groups (Table VII) indicates that this change can not be attributed specifically to vitamin E.

SUMMARY

A trial of oral administration of vitamin E in diabetes mellitus is reported. Elevation of plasma tocopherol was the only demonstrable effect which could be attributed to vitamin E

TABLE VII.

EFFECTS OF TREATMENT WITH VITAMIN E AND PLACEBOS ON FEELING OF FATIGUE

	Number of cases	
	Vitamin E group	*Placebo group*
No change	22	14
Less fatigue	11	5
More fatigue	2	1

therapy. No evidence has been found to support the view that vitamin E is of value in the treatment of diabetes mellitus.

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Damaged dishes can spread disease. One Province recently advised restaurant patrons to reject chipped or cracked crockery placed before them. Care is needed, too, with cutlery. Forks, particularly, can harbour germs at the base of their prongs. Whether at family table or when dining out, ensure that utensils are as clean as the food you eat, for health safety.

MEDICAL MANAGEMENT OF BRONCHIAL ASTHMA

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THE irritable, cranky asthmatic, fretfully wheezing through the nights; the excitable child, often the only one, setting the house in turmoil with his coughing and gasping paroxysms, all too frequently represent a baffling, distressing and sometimes annoying problem to every medical practitioner. The attacks may be haphazard and frantic, occurring at the most inconvenient times, or they may be predictable and supervene on a period of unusual activity or excitement in the life of the adult or child. Cold air, hot air, dust, fresh fruit, fumes, everything and anything are blamed for precipitating the last seizure. So often it is reported to the physician that such and such a drug helped for a time and then lost its effect and that others have been tried with the same result, until an atmosphere of despair and hopelessness surrounds the patient and is apt to envelop the physician.

It is generally recognized that these patients are strung-up, tense, irascible, over-ambitious, and over-anxious, but only too often this factor is overlooked or discounted.

During the past two years the writer in conjunction with the conventional antiallergic and antispasmodic measures[1, 2, 3] has used a simplified psychotherapy of suggestion and explanation based on the method of T. A. Ross.[4] The first instance in which it was attempted was a severe and progressive case of several years standing which had failed to respond to any and all the usual medical measures. By means of suggestion and explanation alone complete relief was finally obtained. Since then I have used the method more and more and it has proved a most fruitful line of attack. Failures have occurred, but the answer has been obvious; even in some instances to the patient himself. The group of individuals who understand their trouble but cannot adjust to it, are an even sorrier lot than those who through stupidity or pride cannot grasp the true nature of their illness.

With increasing experience in the subject I have been unable to avoid the conclusion that the preponderant majority of cases of bronchial

asthma are induced by the interaction of emotional tension on the prepared soil of a respiratory tract sensitized by a constitutional allergy, and its attendant infections. Cardiac and renal insufficiency may give rise to the asthma syndrome and must be watched for, but they represent a group of cases not under consideration in this communication.

The etiology of bronchial asthma may be classified as follows:

(A) *Primary factors:*

1. Allergy. (*a*) Bronchitis. (*b*) Polyposis. (*c*) Sinus infection.
2. Unrelieved or repressed strong feeling causing nervous tension and expressing itself through an over-reacting vegetative nervous system. (*a*) Repetition of a previous painful and sensitizing situation leading to emotional over-reaction. (*b*) Tormenting personal situations. (*c*) Inadequacy of personality.

(B) *Secondary intensifying factors:*

3. The vicious circle of anxiety.
4. Increasing physical sensitivity to mildly noxious inhalants as cold air, fumes, gases and smoke.
5. Bad breathing habits based on nervousness.

The primary factors of allergy and emotional tension are the fundamental cause of bronchial asthma. Either factor may be of slight or great importance in producing the symptom. If both components are considered to comprise 100% of the cause then allergy may vary from 10 to 90% in importance and emotional tension the same. A mild allergy is often the source of chronic bronchitis and sinusitis and is almost invariably at the root of polyposis of the upper respiratory passages. These ailments are notorious as agents in the production of chronic ill health leading to fatigue and irritability and a reduction in the feeling of well-being. Allergy in its effect produces, therefore, a tendency to nervous tension, irritability and fatigue, as the patient has to fight down his bad feelings to carry out his normal activities.

Again the bronchial mucosa, swollen from infected allergic bronchitis, shuts off or constricts the bronchial lumen much more readily than a normal mucous membrane. Bronchospasm and air hunger occurring in nervous states, excitement or with strenuous physical activity, where bronchitis is present, readily produce, therefore, distressing asthma. Often in an asthmatic the allergy is minimal but as it operates over many years producing catarrhal infections, polyposis, recurrent attacks of acute bronchitis and pneumonia, there is a gradual setting of the stage for the onset of asthma itself. The allergy may be the sole cause of the symptom in such cases as seasonal hayfever and asthma or in the case of a man only having asthma when near certain animals. In these instances, separation of the patient and allergen or a course of hyposensitization may effect a dramatic cure.

Intense feelings, finding no relieving outlet, key-up the autonomic nervous system, rendering it over-reactive and overly sensitive to a wide range of minor stimuli. In the asthmatic an attack may come on after reading a death notice in the paper, or after some chance remark by a member of the family. In one of my cases the wife expressed anxiety about the expense of the illness and the patient immediately developed a severe paroxysm lasting three days. These individuals have often inherited a sensitive over-reactive nervous system and a quick intelligence with a vivid imagination. Where such personal traits are present ordinary excitements, irritations and tensions are accompanied by excessive somatic reactions in various viscera. If a weak spot has been established in the respiratory tract in the form of bronchitis any prolonged emotional strain is apt to induce asthma.

The patient may not be unduly excitable but may be caught up in some unduly tormenting situation. Such situations are not uncommon. In one case which came under my care, a business man of rather quick and anxious temperament who had been carrying a heavy load during the war years, suffered a moderate disappointment in his business and at the same time had to take his ailing and not too pleasant mother-in-law into his home. He developed a persistent and severe asthma. In another case, a middle-aged merchant also rather quick and anxious married a strong-willed, unimaginative, managing woman who proceeded to follow her own course of action in her own way. The patient was highly resentful at being managed and having his wishes disregarded but was too sensitive to precipitate a battle. His asthma began shortly before the marriage and grew steadily worse over a period of five years, during which time three children were produced to add anxiety to the resentful feelings.

In both the above cases there was a history of bronchitis due to mild allergy extending over thirty years but the asthma did not develop until the patients both were caught up in a situation charged with bad feelings.

The circumstances may be exceptionally trying or the patient may over-react to the ordinary trials of life. An example of the latter type of case was encountered in a middle aged spinster who without friends or special training was restricted to working in a factory and living in a rooming house. Her asthma gradually increased until she could not work. On admission to hospital, without special treatment, her symptoms would quickly subside. Following discharge, the asthma would recur within a month and she would be forced to return to hospital only to have the asthma rapidly clear. Allergy was not a factor of any significance, and as the patient's mental equipment was not of a high order, psychotherapy was of little avail. In this case the burden of making her way in the world was just too much, tension developed and bronchospasm was its expression.

The psychological approach to asthma in a great many cases makes all the difference between success and failure, but it is not a panacea. Many individuals are too dull mentally to grasp an explanation and act on it. Others have so rigid a reaction pattern that they can not be changed. Increasing years are particularly prone to be accompanied by a fixity of habits which become as toughly ingrained as the scar of an old laceration. Middle-aged and elderly patients understand an explanation, mean to co-operate, leave the office and through habit do exactly the opposite. A patient may be too proud to admit to himself that his own habits are the cause of the illness.

In some patients the emotions are so labile they cannot bother to develop control. In other patients no way out of the tormenting impasse can be found, or they can not be induced to organize themselves behind a drive to correct either their own reactions or their situation. In some individuals the possibility of reward through renewed health is not sufficient incentive and they are unable to make the effort necessary to become well. On the whole, however, the asthmatic has a much more satisfactory personality to work on than the hysteric, the alcoholic, or the anxiety-neurotic. He is tougher, more intelligent and more honest. He often reacts well against unpleasant feelings and tensions.

Child and adolescent asthmatics being more plastic and more amenable to suggestion respond very well to psychological handling. The chief problem with children is their parents. They may be over-anxious and fussy or too cold or too distracted by outside activities. The parents must be led to see the necessity for giving the child lots of warm affection combined with kindly but firm discipline. It is amazing the amount of discipline a child will gladly accept if he feels secure and loved. A fussy mother can whip up a feeling of fear in a child by being frightened and anxious herself. On the other hand if the parents are fagged, distracted, cold or out much of the time, a child misses that atmosphere of warm affection and moral support so necessary for normal development.

As the distressing bronchospasm increases, there is much discomfort, much fear and loss of sleep. The patient becomes tired, irritable, and is frightened of the next attack. A certain periodicity develops and a feeling of apprehension wells up in anticipation of the next attack. The patient dreads his expected paroxysm and he is angry at its interference with his normal activities. As time goes on, one symptomatic treatment after another become ineffective, the anxiety and irritability becomes more intense and the patient loses heart. He is anxiously and irritably sure that he is to have a bad night, and that very thought-feeling complex makes certain a bad night will ensue. Each bad night results in more fear, fatigue and irritability leading to increasingly severe and prolonged paroxysms.

The natural tendency of asthma is to grow worse or at best persist, unless some change occurs in the patient's situation allergically or emotionally. As the physical condition deteriorates and the general feeling of well-being decreases, the patient becomes less and less able to turn and face his difficulties. The unpleasant awareness of the asthma so fills every spare moment of his consciousness that the tormenting problems are pushed more and more into the background. Even after the difficulties have resolved themselves, the vicious circle of anxiety, fatigue and irritability will often carry the asthma along. Local irritability in the bronchial tree increases with each paroxysm. Physical exercise, stuffy rooms, fumes, dust and smoke which the patient previously

tolerated well become inciting agents for the more frequent attacks. The patient also begins to fear changes in atmosphere and the fear itself is a potent force in producing bronchospasm.

If the five etiological factors are kept in mind, the investigation of a case of asthma will be conducted logically and fully. A complete conventional medical history is the first essential. Emphasis is placed on the circumstances surrounding the onset and the development of the asthmatic paroxysms. Full inquiry must be made of the usual allergic factors of season, weather, dust, animals, plants, new furniture, etc. Family history of allergic tendencies is also elicited. In obtaining the story of previous health and the family and marital history, much information can be obtained on the patient's reaction to his family, personal difficulties and illnesses, without him being aware that personal affairs are being investigated.

The personal history takes in family background, adjustments to school, extracurricular activities, employment and marriage. It fills the gaps in the formal history. If the patient's manner suggests a desire to pour out some account of his personal affairs, the story should not be cut off, but should be carefully extracted. Often he will drop a hint or remark indicating some deep anxiety. Such hints must not be neglected but should be followed up as diplomatically as possible. Previous painful experiences sensitize the patient and any repetition of the previous circumstances are conductive to an emotional over-reaction. Such experiences lead to conditioned reflexes of one sort or another and must be watched for. With practice, the main outlines of the case can generally be obtained in an hour and further information to clarify and extend the history turns up on subsequent visits.

A searching physical examination is not only essential to the appraisal of the patient's physical status, but is also a most potent weapon in helping to re-establish the patient's self-confidence. He senses that he is in the hands of a thorough physician who knows everything there is to know about the case. When such a feeling is established the physician's power of suggestion is intensified many fold. Particular care must be taken to ensure that cardiac or renal insufficiency are not a factor in the case. When the history and examination are finished, allergy skin tests are conducted along with any other tests which may be indicated such as chest x-rays, blood studies, etc. When the case is complete, the two primary factors and the three secondary intensifying factors are appraised and the relative importance of each is assessed.

The patient is then given a full explanation of the asthmatic mechanism as it applies to him. The procedures necessary for him to regain his health are outlined. If the prospects look hopeful at all, he is assured that asthma is a curable condition and that the first step toward recovery is up to him. He is told that the fear of the condition is one of the main causes of its continuance, and that if he can grasp that fact and not be afraid, the asthma will be much less severe. If the physician has his patient well in hand, such suggestion has a very strong effect. The patient trusting his doctor, gains hope, becomes less anxious and the asthma does diminish.

The next step consists of explaining how bottled-up, anxious, irritable and resentful feelings in certain situations have been associated with the asthmatic paroxysms. If a good history has been taken, the relationship of the asthmatic attacks to the various irritating personal circumstances is often striking. The patient is advised that he must reconsider his difficulties, face up to them and work out some sort of answer. If he grasps the explanation and understands the relationship between his emotional tensions and his asthma, it does not take too much of an effort for him to try and mend his ways. He is given the choice of correcting his situation or if nothing can be done, of resigning himself to the inevitable. In either case relaxation will supervene if the patient is honest with himself.

It is explained that mature or grown-up behaviour requires that difficult problems be faced and a sensible decision be taken and adhered to. He is told that he has been acting somewhat after the manner of a child in bed at night, who hearing a noise downstairs, becomes frightened and anxious and does nothing but pull the bedclothes over his head. The mature way of dealing with such a problem is to go downstairs, investigate the noise and stop it or at least know what it is. It might even be necessary to call a policeman. But whatever the event, fear or anxiety have been dissipated. The patient can relax. Reality is not uncommonly

grim and painful. It often takes courage, and a love of integrity not to try and escape in daydreams, books, liquor, or symptoms. Here again the physician who has the trust and respect of his patient can by encouragement and suggestion work wonders in helping the poor sufferer, gather up his will, take heart and make the necessary effort.

The factor of increasing irritability of the bronchial tree as the asthma progresses is explained. The patient is assured that as the asthma subsides, stuffy rooms, smoke, drafts, cold air and dust will affect him less and less. Again suggestion from a trusted physician is a most potent force. The breathing habits must be carefully observed, not only during the quiet periods but also in the heat of a seizure. In children particularly and nervous adults a frantic air hunger may be noted with irregular deep sobbing or sighing respirations. The chest may be thrown forward as the back and neck muscles tighten while actual inspiration of air is close to zero. In every asthmatic during a paroxysm there is a considerable element of heaving breast type of breathing which occurs in anyone in the grip of a powerful emotion. Such respiratory habits have much to do with the building up of a severe bronchospasm. I have often been able to settle a tormented patient with a few reassuring suggestions, combined with some simple instruction on how to inhale and exhale properly. Breathing exercises, practised regularly, are often helpful in that the patient employing the exercises at the onset can often abort an attack.

Finally the patient is told that he must cool off, relax, take his time and not rush about excitedly. Children temporarily must give up competitive games and sports in order to avoid excitement and strenuous physical activity. Parents of an asthmatic child are told to keep calm and cool, to be affectionate and interested but firm in discipline. If the patient is intelligent and is genuinely anxious to become well, if he can control his personal affairs and obtain the co-operation of his family, one explanatory and suggestive session will often relieve a mild to moderate asthma almost completely. More severe cases may require a long or short period in hospital with daily psychotherapeutic sessions (see Case 3).

For the patient in status asthmaticus hospital care is essential. The most simple and efficient treatment in my experience has been 5% ethyl alcohol in 5% glucose saline,[5] given continuously at a sufficient rate to keep the patient in an alcoholic stupor for three or more days. A flow of 60 to 100 drops per minute is necessary. So far, I have encountered no evidence of right heart strain. Vitamin B complex is given intramuscularly to cover the metabolism of the alcohol and glucose.

Specific anti-allergic treatment is withheld until the patient shows that he has grasped the the explanation of the nature of asthma and has mended his ways to the extent of reducing his paroxysms to minor proportions. Specific allergic treatment at this point will generally clinch the cure by reducing, or eliminating the catarrh, rhinitis, bronchitis and the head and chest colds so frequently encountered in the patient with a hereditary allergy. If anti-allergic treatment is given alone, or given too soon, the patient will not make the effort necessary to control his own feelings and habits, with the result that the treatment is not successful and the end result due to increasing anxiety and disappointment is worse than the beginning.

The family doctor, knowing his patient's background, his home life and general situation often need only put a few pointed questions to elicit the cause of an onsetting asthma. A common sense explanation of the effects of emotional tension in producing the symptom along with advice on how to relax plus a reassuring attitude will often do more good than all the drugs in the pharmacopœia. Certainly it is most unwise to allow the average patient to rely on drugs or anti-allergic measures alone as he will then not make the necessary efforts to cure himself.

From a group of similar cases of mild to severe degree the following illustrative histories have been selected:

CASE 1

W.B., aged 33. A highstrung, excitable and rather immature insurance salesman was referred for treatment of asthma in October, 1947. The trouble had begun in August, 1947. There had not been any allergic manifestations previously. Skin tests revealed several sensitivities. The usual measures of protection against feathers, animals and dust were instituted and a course of hyposensitization to house dust and mold was begun. Until the specific measures became effective, the patient was provided with adrenalin.

There was no attempt at psychotherapy. After two months the patient was worse. It turned out that he was rushing about anxiously selling insurance for two or three hours until the asthma became too severe. He would then go home for some adrenalin to obtain relief. He worked morning, afternoon and evening and over the week-ends and was always overactive. One could never be sure of the effect of the vaccine injections; there

might be a severe reaction or none at all. He was finally admitted to hospital as the asthma was almost continuous. In bed, with ordinary sedation and an occasional antispasmodic, the bronchospasm rapidly subsided.

Some psychotherapy was given in hospital, but the damage had already been done. The patient did slow up for a month or two, and he was improved. His vaccine injections gave little trouble. He was, however, unable or unwilling to correct his habits. He began to indulge again in his excitements, and anxieties; the asthma recurred and he turned to the adrenalin once more. Vaccine injections again became very variable in their effect. The patient unknown to myself would regale the office nurse with his exciting week-end trips and parties. After several months the patient failed to return for treatment. When last seen he was rather childishly pleased at the prospect of a trip to Arizona for the winter with his wife and family. His asthma was again severe and his habits as bad as ever.

In this instance neglect of early psychotherapy and of insistance that the patient mend his ways before physical treatment was begun, resulted in a failure.

CASE 2

S.L., aged 53. The proprietor of a drug store was referred for treatment in January, 1948. He had suffered from bronchitis for 30 years. In June of 1947 he began to suffer asthmatic attacks, and after six months he was in chronic distress, having to spend most nights sitting up in a chair to get his breath.

The psychological factors were two. The main difficulty was that having been short of staff all through the war, he was anxiously awaiting the arrival of an assistant to help carry the load. The assistant failed to qualify himself in the May examinations, and the patient had to look worward to another year of excessive care and worry. At the time of onset the mother-in-law whom he detested fell ill and had to be taken into his home. The conventional symptomatic treatments had given only mild and temporary relief. The asthma progressed and the patient had become increasingly anxious fatigued and irritable.

After full investigation and one explanatory and reassuring talk, he was instructed to think the explanation over and return in two weeks. The patient followed the advice closely and on his return reported that he was sleeping well and that he had only suffered two mild attacks in the interval. A course of hyposensitization to house dust and mold was then, but only then begun. Six months later the patient reported to his family physician that he has not felt so well in years.

In this instance an intelligent and sincere patient, with reasonable control of his personal situation, was able to change his thought-feeling habits and so rid himself of a distressing asthma. The course of serum injections affected the bronchitis, but had no effect on the asthmatic paroxysms as they had already been relieved before the treatments were begun.

CASE 3

W.D., aged 54. The proprietor of a furniture business was turned over to my care while in hospital in status asthmaticus. His illness had begun five years before and had progressed steadily. There had been a careful allergic investigation two years previously but the conventional measures employed as a result of the investigation had proved of no avail.

While in hospital further very thorough anti-allergic measures had yielded no benefit. The case was, therefore undertaken with many misgivings. The first step in the management of the case was a careful explanation to the patient that a completely new line of treatment was to be undertaken, that asthma was a curable condition and that he need have no fear of his ultimate recovery. The suggestion caused sufficient improvement for the patient to recount his history without too great respiratory embarrassment.

The salient points of the history were as follows: At age 24 he had suffered a severe pneumonia and empyema. He had been left with a chronic bronchitis which had persisted throughout the years. While still ill from the empyema his fiancee had died suddenly and for over a year he was in an neurasthenic state, unable to work. The asthma had begun at the age of 50 a few months prior to his marriage to a woman twelve years his junior. The patient, an anxious, intelligent, overactive and irascible man, married a wife of rather heavy, matter of fact, mildly sluggish and managing temperament. The patient had seen one delicately and imaginatively conceived plan after another trampled under by the rather dull practicality of his wife and her family. He had been a free agent until the age of 50 and it was difficult to adjust himself to this intrusion of a somewhat overwhelming influence in his life. He became increasingly resentful but as his wife bore him three children in rapid succession, the problem of precipitating a showdown was obviously very difficult.

The bottled up resentful feelings led to increasing emotional tension with ever more severe asthmatic paroxysms. As the patient's health began to fail, anxiety for the future of the small children was added to the resentful and irritable feelings. There were no sexual difficulties.

Treatment consisted of leading the patient to understand the nature of his illness and through such understanding to lose his fear and certain conviction that there was no hope. Subshock insulin was used as an adjunct to produce sedation, and improvement in nutrition, which was at a low ebb. After three weeks of daily psychotherapeutic sessions the patient was free from bronchospasm and able to walk outside for brief periods.

Through inexperience, I then committed a serious blunder. The patient understood his illness but had not adjusted emotionally to his home situation. The day before he was to be discharged to his home, he developed an attack of asthma which quickly responded to sedation.

Following his arrival at home the asthma steadily increased to such a point that further treatment in hospital became necessary. During this second period under care, the patient was much worse and for a two week period he actually hovered between life and death. The added malign influence was his loss of hope and confidence in the new treatment. It was noted that after each visit from his wife he would become violently ill. She would make some remark about the hopelessness of the case or the expense of the very necessary special nurses. She was finally persuaded to stay away even though her husband was nearly dead. Rapid improvement ensued. The wife evinced little understanding of the psychological processes involved but she was impressed by her husband's rapid recovery when she stayed away from him.

The problem of ultimate disposal arose with the patient's second recovery. It was finally decided that an institution for nervous disorders might prove helpful. With much trepidation he was transferred to the institution, and by means of further psychological treatment he was desensitized to his home and was gradually reintroduced to it over a period of three months. When last heard of, after a year and one-half, he was still well, working and free from asthma.

This case illustrates many features of the asthma syndrome, namely: (1) The natural tendency to progress. (1) The mild allergy leading to bronchitis which prepares the soil

for bronchial asthma. (3) The potent effect of hope and disappointment. (4) The importance of interpersonal family relationships. (5) The necessity for prolonged treatment in severe cases in older patients. (6) The importance of adequate financial resources where prolonged treatment is necessary. (7) The fact that where words fail, drastic action is often impressive to the patient or his wife.

SUMMARY

There is an allergic and an emotional component in each case of bronchial asthma, and either component may vary from 10 to 90% in importance.

The psychological effect of the paroxysms themselves is a major factor in maintaining the asthma.

Many patients, due to a defect in the personality structure, or due to overwhelmingly difficult conditions in their personal situation do not respond to psychotherapy.

In most moderate cases, specific and symptomatic treatment is often better withheld until the patient through his own efforts has been able to induce considerable relief.

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THE PATHOLOGY AND TREATMENT OF THE POST-PHLEBITIC LEG AND ITS COMPLICATIONS*

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THE subject of thrombophlebitis and phlebothrombosis of the deep leg veins has been the object of a large volume of literature in the past five years and there is no doubt that the relatively recent additions of surgery and anticoagulant therapy in the treatment of these conditions has reduced the morbidity and mortality. It is to be hoped also that these newer methods of therapy will reduce the late disabling sequelæ of the thrombophlebitic leg. As yet, however, these improvements in treatment have not borne fruit and, at the present time, we are dealing with the complications of phlebitis, which occurred up to thirty years ago. Despite new methods of treatment, the diagnosis of thrombophlebitis of the deep leg veins is frequently made at a late stage and therefore it is likely that the problem of its late complications including indurations, ulceration, eczema and chronic œdema will always be with us.

There appears to be a scarcity of actual knowledge as to what happens to the deep veins following such a lesion, and especially what the condition of the venous return is like many years later. Also, at the present time, the treatment of the post-phlebitic complications is far from standardized and the results of therapy leave a great deal to be desired. It is the purpose of this presentation to report the pathological findings visualized by retrograde venography in a series of these cases and to attempt a formulation of policy in their treatment.

Twenty-eight cases from both the outpatient and inpatient services of the Royal Victoria Hospital have been studied, all of which had the complications of chronic œdema associated with ulceration or eczema of the lower leg. In each of these cases, retrograde venography was attempted with the plan of visualizing the deep venous system of the leg and in this way obtaining graphic evidence of the state of these veins. Retrograde venography was chosen rather than the usual pronade method as it gave a better visualization of the vein, the collaterals and the efficacy of the valvular mechanism. These venograms were carried out using 20 c.c. of diodrast injected without undue pressure by direct venipuncture into the common femoral vein with the patient lying on the x-ray table. An assistant occluded the vein centrally to prevent loss of the solution into the general circulation. A successful injection was accomplished in 18 cases and, in the remainder, the injection was technically imperfect or the common femoral vein could not be found by venipuncture. Of the six cases where the vein could not be found, four were subjected to exploration of the upper femoral region to find why the vein could not be reached on venipuncture and to test the efficacy of the procedure of ligation of the femoral vein (either superficial or common

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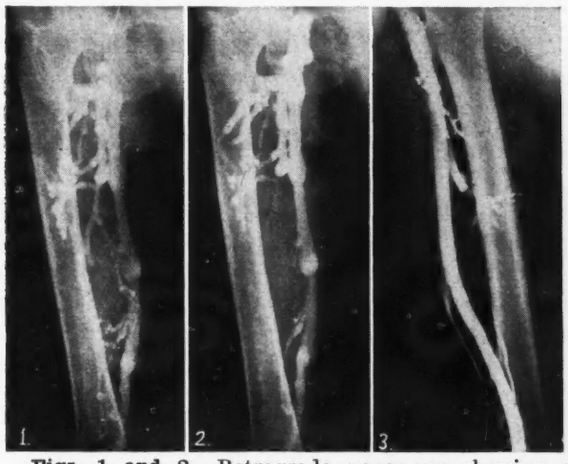
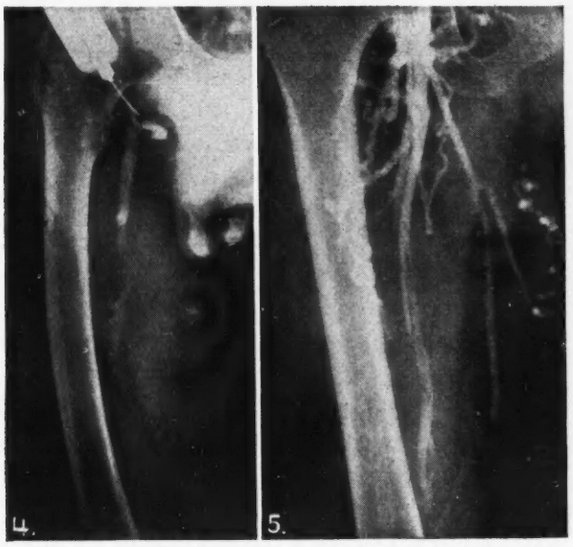
femoral) as advocated by Linton,[1] Buxton and Coller[2] and others.

In those where proper venograms were obtained, it was obvious that a grossly abnormal deep venous circulation was present. The changes revealed by the x-ray consisted of loss of function (Figs. 1 and 2) or actual disappearance (Fig. 3) of the valves of the deep veins allowing retrograde filling of the frequently to well below the knee. Twelve of the venograms fell into these two groups. Irregularities of the lumen of the main vein (Fig. 3) indicating recanalized thrombosis was seen in six of the cases. In practically every case there was evidence of dilatation and tortuosity (Fig. 4) of the collateral venous channels. All the above mentioned venous changes were not unexpected, but the point we wish to emphasize is that the degree of venous changes seen, from that of valvular damage only to that of almost complete obliteration of the vein seemed to have little bearing on the occurrence, degree and extent of the post-phlebitic complications. The case with minimal venous damage could have just as bad a leg as the one with almost complete venous obliteration. In the four cases whose femoral vein could not be reached by venipuncture and who were explored, the reason was quite obvious, inasmuch as the superficial femoral and to a lesser extent the common femoral vein was found to be a white solid fibrotic cord with marked perivenous fibrosis and with a lumen which showed several small venous channels separated by fibrous septa, presumably the result of thrombus organization (Fig. 5). Again, in these cases, the leg lesions appeared no different from those with lesser degrees of venous obliteration.



Figs. 1 and 2.—Retrograde venogram showing a relatively normal calibre of the femoral vein but with incompetent valves allowing reverse flow. Bulbous dilatation of the vein at the valve sites is present. **Fig. 3.**—A normal calibre of the vein is present but the valvular mechanism is completely absent and reversal of the diodrast in this case extended to almost the ankle.



Figs. 4 and 5.—Irregularity and distal obliteration of the femoral vein due to organized thrombus can be readily seen. A competent valve at the junction of the profunda femoris vein is present in Fig. 4.

Figs. 6 and 7.—The superficial femoral vein is completely absent presumably due to organized thrombus. Numerous dilated tortuous collateral channels are present.

In the light of this information, some speculation as to the etiology of these post-phlebitic complications seems possible. Those surgeons who have done any number of femoral vein ligations, either prophylactic or for phlebothrombosis, have noticed the large lymphatic channel running on the anterior half of the upper femoral vein. This resembles a nerve and is usually carefully separated and re-

tracted. On one occasion, however, the author inadvertently cut this vessel and noted the lymph spurt from the vessel to the height of one inch. Incidentally the œdema of the lower leg in this case later was much more persistent and extensive than that normally seen in vein ligation for phlebothrombosis. In acute thrombophlebitis with its marked inflammatory involvement of the vein wall and perivenous structures, the lymphatic trunks are invariably involved by inflammatory and later scar replacement. This was well seen in the four cases explored where these lymphatic trunks were searched for but could not be identified in their normal relationship to the femoral vein. This fact also probably accounts for the small amount or absence of œdema in the leg where phlebothrombosis is present as against the massive œdema seen in acute thrombophlebitis. In both, the vein has been occluded by thrombus, but in the phlebothrombotic vein, there is no perivenous involvement whereas in the thrombophlebitic vein this is marked.

This etiological factor was first emphasized by Homans[3] and has been confirmed or belittled by numerous authors since that time.[4, 5] However, the author firmly believes that it is the major cause of the persistent œdema in the post-phlebitic leg.

Chronic retardation of the venous return also assists in producing leg œdema. Increased venous pressures as demonstrated by Linton and Hardy[1] lead to slowing of flow in the capillary loop, increased transudation, and chronic malnutrition of the surrounding tissues. The effects of this venous retardation and its evil effects are well seen in the long-standing case of superficial varicose veins where similar "stasis" changes in the superficial tissues are seen in the absence of lymphatic and deep venous involvement.

However, the twin factors of lymphatic and venous stasis are not *per se* the causes of the complications seen in the post-phlebitic leg. They are the soil ready for the planting of the seed. This seed is the entrance of organisms into this fertile soil usually by the trauma of scratching or injury, lesions which are of little moment to the normal leg but are of serious import to that where a previous thrombophlebitis has been present. This influence of infection is understandable where one sees so many post-phlebitic legs where the inroads of infection have been absent and so complications of eczema and ulcer have not occurred. This is the case in most persons in the better income brackets who have taken care of their leg as against the clinic type of patient who disregards instructions and constantly returns with recurrent ulceration following a minor trauma or scratching. Infection introduced into the post-phlebitic leg from some superficial abrasion usually runs a very chronic course and produces the indurations and chronic cellulitis which break down to ulcers. Once infection has gained a foothold in the post-phlebitic leg it is extremely hard to eradicate, remaining semi-dormant in the areas of induration and flaring into activity on overuse of the limb with its coincident increase in œdema.

CLINICAL TYPES

In this study, an attempt was made to group these post-phlebitic legs into different clinical types so that treatment would follow certain specific lines. It was observed that factors other than the post-phlebitic complications were present in many of those cases. These added factors were the presence of secondary incompetent varicose veins, signs of mild sympathetic dystrophy in the involved leg and finally markedly increased degree of tissue sclerosis surrounding the area of lower leg ulceration. The remainder, comprising the largest single group, showed no evidence of incompetent superficial veins, sympathetic overactivity or marked local tissue sclerosis. Treatment therefore has been devised according to these four different groups.

Group 1.—The development of incompetent varicose veins following a previous deep phlebitis is undoubtedly due to the damage of the valvular mechanism in the deep veins allowing transmission of increased venous pressure to these hitherto competent superficial veins. Any increase in intra-abdominal pressure such as occurs in coughing, straining and lifting results in increased venous pressures which are transmitted peripherally and so affect the saphenous systems. Why all post-phlebitic legs do not have secondary superficial varicosities probably depends on the strength of the valves in the saphenous system. These valves vary greatly in their function and strength, becoming incompetent early in

the usual case of familial varicose veins and remaining perfectly normal after the insult of many pregnancies in other cases. When incompetent superficial veins are present in the post-phlebitic leg they constitute an "insult to injury" to the deep venous flow. Reverse flow and venous stasis occur in these superficial veins and the original factor of venous stasis in the deep veins is thereby aggravated.

These superficial veins are therefore more of a hindrance than a help to the leg and it seems logical that their correction will help to some degree. This idea is contrary to the accepted and often repeated statement that all secondary superficial veins are due to a compensatory mechanism following the deep venous damage and consequently should be left alone. This previous idea may be correct when the patient is recumbent, but certainly not when in the erect position. It seems somewhat paradoxical that the proponents of this idea of the veins being compensatory in nature would advise the wearing of elastic stockings in cases of secondary varicose veins because such a stocking, if sufficiently constrictive, produces obliteration of these superficial veins. In the past seven years the author, employing the plan that surgical correction of these incompetent superficial veins would result in benefit to the leg, has surgically corrected over forty such cases with no ill effects to the leg and definite increased healing of the existing ulceration and eczema. It must be emphasized that the preoperative assessment of such superficial varicosities must be thorough and painstaking and that all points of communicating vein incompetence be carefully determined before ligation.

In the present series, 9 of the 28 cases showed such incompetent superficial veins and were treated as in any case of primary varicose veins by determining the points of reverse flow by means of the multiple tourniquet test and then ligation of the saphenous vein at these points. All cases needed a ligation of the saphenous at the femoral junction, the majority required ligation of incompetent communicating veins in the lower medial thigh or below knee area and the odd case had a high ligation of the small saphenous vein. Sclerosing fluid was not injected at operation, but was used in small quantities in the varices of the lower leg after the ulcer had healed and the patient was ambulatory. It is our impression that the post-phlebitic complications healed more rapidly following this treatment and that recurrence was made less likely. However it was obligatory that such patients follow the postoperative instructions which we have termed the "New Way of Life" and which are outlined in the discussion of conservative therapy (Group 4). In a follow-up of these nine cases from three months to three years no recurrent ulceration has taken place.

Group 2.—The occasional case of post-phlebitic leg shows evidence of sympathetic over-stimulation in the involved extremity. Such cases can be suspected by the complaint of abnormally severe pain in the ulcer and also the surrounding area with radiation upward as far as the hip. This pain is present both in the day and frequently worse at night and has the characteristic of being burning and scalding in type. Associated signs are coolness of the foot on the affected side in comparison with the other, increased sweating of this foot and usually decreased amplitude of the pedal pulses, a point which can be confirmed by decreased oscillometric readings in this leg in comparison with the opposite. Whether this sympathetic dystrophy is the result of the original phlebitis or subsequent to the development of the post-phlebitic ulcer is difficult to say, as such a dystrophy can follow either factor. Lumbar sympathetic procaine block in such a case should give immediate temporary cessation of pain, improve pulse volume in the foot, inhibit sweating and increase distal skin temperatures. The relief of pain is the most important confirmatory result. Lumbar sympathectomy will make such results permanent and give marked acceleration of healing of the ulcer. Four cases in this series have been so treated and placed on the regimen of the "new way of life" after healing the ulcer. To date no recurrence has taken place in these four, the most recent case being six months and the longest slightly over three years.

Group 3.—In cases where the ulceration has been intermittently recurrent over many years in the same area of the leg, local changes in the skin, subcutaneous tissue and deep fascia take place. The skin becomes extremely thin and tissue paper-like in appearance. Elasticity is lost and the blood supply is poor. The subcutaneous fat is largely replaced by poorly

vascularized scar tissue and the deep fascia is markedly thickened and hard. Occasionally large incompetent varicose veins are imbedded in this scar tissue. Such changes represent repeated ulceration and gradual healing with marked scarring and devitalization. Each episode of ulceration leaves the area less able to resist further insults. It is logical to assume that ulcer recurrence is very likely in such an area even with extreme care and also logical to assume that removal of such devitalized tissue with the application of a skin graft will decrease the possibility of recurrence. This method is a tried and true one and has been employed for many years. In this series six cases were so treated, two of which also had coincident saphenous vein ligation. The involved area, including the deep fascia was excised and the area covered by a split skin graft. Again it should be emphasized that this method is not a cure and that recurrence is likely at the edge of the graft unless the "new way of life" is followed for the remainder of the individual's life.

Before a discussion of the conservative method of treatment, mention should be made of a popular form of treatment at the present time, that of femoral vein ligation. As was pointed out in the results of the venograms, we have found no correlation between the state of the post-phlebitic deep veins and the extent of the complications. In some cases the degree of the vein involvement by organized thrombus is almost equivalent to a vein ligation and yet the complications still develop, and we therefore see little rationale in ligation of the incompetent deep vein. Granted that no harm may result from such a procedure, nevertheless we fail to see how benefit will be given. In Linton and Hardy's series they combined femoral vein ligation with stripping of the superficial veins and it is our opinion that the good results were largely the result of the latter procedure. In the four cases before mentioned who were explored and the superficial femoral vein ligated we failed to see much immediate improvement in the rate of ulcer healing. Of the four recurrences which have taken place in this series despite the "new way of life" two were in these cases where the femoral vein had been ligated and the other two were following conservative therapy.

Group 4.—The greatest single group of post-phlebitic legs with complications do not show any definite degree of the findings described in groups 1, 2 and 3. The superficial veins are few and do not show a positive Trendelenburg test; the signs of sympathetic dystrophy are absent and the local tissue sclerosis is not marked. In such cases, therefore, conservative therapy is indicated. This consists, in our hands, of bed rest, elevation of the foot of the bed and the leg in bed and the frequent application of moist hot saline dressings during the acute exudative stage of the ulcer. If in hospital, this is followed by tyrothrycin dressings or the use of dried red blood cell paste. Penicillin is given either intramuscularly or daily into the femoral artery of the involved leg according to the method of Shaffer.[6] Sulfa ointment is contraindicated due to the occasional generalized sensitivity reactions and the same can be said for penicillin cream. The patient who refuses bed rest or cannot carry it out due to economic reasons is treated by Unna's paste boots. The author does not employ elastic adhesive casts because of the rather frequent dermatitis it produces. Healing, however, is prolonged in such cases. When the ulcer is healed, a properly fitted elastic stocking is applied and the patient instructed in the new way of life. The question will arise that cannot all cases be healed by prolonged conservative methods with the exclusion of surgery? We believe they can if the patient will stay in bed long enough, but that the surgical methods previously discussed accelerate healing, lessen disability and are a safeguard in the prevention of recurrence. However, it cannot be too often reiterated that any method of treatment, including surgical, used to heal the complications is not in itself a cure.

Recurrence is inevitable in most cases unless the individual is impressed with the fact that she has a permanently damaged leg for which there is no cure, but that if she follows the simple common sense rules laid down below further complications will likely be prevented.

THE NEW WAY OF LIFE

INSTRUCTIONS FOR THE CONTINUAL CARE OF THE LEG DAMAGED BY PHLEBITIS

1. Wear your elastic stocking from the time you get out of bed until you retire, with the exception of bath time. The stocking should be renewed every three months, and it is best to have two stockings that can be alternated for cleaning purposes.

2. Do not stand for more than thirty minutes without sitting down for fifteen minutes and elevating the leg on another chair. When standing, get into the habit of

flexing the toes in your shoes and frequently rising on tip toes.

3. Plan your day so that you can lie down for two to three half hour periods and elevate your leg to a 45 degree angle. The back of a small straight backed chair is useful for this purpose.

4. When ever you sit down, elevate your leg on a foot-stool, chair or chesterfield.

5. At night raise the foot of the bed on blocks about twelve inches high.

6. Apply a bland cold cream to the affected skin at nights about every second day.

7. Avoid irritation to the involved leg, especially in respect to sunburn and hot water bottles.

8. Be extremely careful to prevent bumping or scratching the affected leg.

SUMMARY

1. Retrograde venograms were successfully accomplished in 18 of this series of 28 cases of legs damaged by a previous deep phlebitis which showed the post-phlebitic complications of ulceration and eczema. All degrees of venous involvement were found ranging from valvular damage only to almost complete obliteration of the vein by organized thrombus.

2. No correlation was found between the degree of venous involvement as shown by the venogram and the extent of the postphlebitic complications, consequently the rôle of the damaged vein in producing these complications is believed to be slight. As a result of this finding, the surgical treatment of ligation of the femoral vein at present in vogue in these cases does not seem logical.

3. The etiology of the post-phlebitic leg and its complications is discussed and the belief expressed that interference of the lymphatic return is the greatest single factor and venous retardation a secondary one. The entrance of pyogenic organisms via superficial trauma in such a leg is the immediate cause of the complications.

4. An attempt has been made to group such cases into four types for the purpose of treatment. These are associated secondary incompetent varicose veins, those with evidence of sympathetic over-activity in the leg, those with marked soft tissue sclerosis about the ulcer and finally the group where the above factors are not present. Emphasis is laid on the point that these forms of therapy are only aids in healing of the complications, giving also some measure of protection against recurrence, but that the greatest single factor in keeping the leg free of troubles is the adoption of the "new way of life" for the remainder of the patient's existence.

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RÉSUMÉ

L'auteur expose le fruit de ses expériences dans le traitement des membres inférieurs ayant déjà été atteints de thrombo-phlébites profondes et de phlébo-thromboses. L'article est basé sur l'étude de 28 cas présentant les complications post-phlébitiques usuelles: les ulcérations et l'eczéma.

La phlébographie rétrograde fut choisie comme mode d'examen. La technique consiste à injecter 20cc. de Diodrast dans la veine fémorale profonde. On ne put établir un rapport entre le degré d'atteinte veineuse constaté sur les films et l'importance des complications post-phlébitique; ce qui semble prouver que le fémorale profonde n'a que peu à faire dans l'élaboration des complications. L'expérience de l'auteur semble confirmer l'hypothèse de Homans ayant trait à l'étiologie des complications. Il semble bien que ce soit le système lymphatique qui joue le plus grand rôle. Les traumatismes contituent la porte d'entrée des agents microbiens précipitant les complications. Dans le but d'assurer un traitement fondé, l'auteur divise ses cas en quatre groupes. Le premier comprend ceux qui sont associés à des veines variqueuses à valvules insuffisantes, le deuxième, ceux qui font preuve d'une suractivité lymphatique, le troisième ceux qui présentent de la sclérose des tissus mous et des ulcères et finalement le quatrième où on ne retrouve pas les facteurs précédents. L'auteur insiste sur le fait que les traitements actuels ne sont que des adjuvants de la guérison des complications et que le principal facteur pour garder une jambe saine et prévenir les rechutes est encore le régime de vie qu'il propose et les soins apportés par le patient.

YVES PRÉVOST

PENICILLIN IN THE TREATMENT OF PRE-NATAL SYPHILIS*

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SINCE the first publication in the autumn of 1944 on the use of penicillin in the treatment of pre-natal syphilis[1] numerous reports of its use have appeared. There has been a constant change in the total dose recommended by various writers and in the treatment schedule. Each writer in turn, when summarizing his results, has pointed out that the number of cases showing a serological relapse could probably have been materially reduced by increased dosage. All writers are agreed on the superi-

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From the wards and out-patient department, Hospital for Sick Children, Toronto.

ority of this method of treatment over the previously used arsenical and bismuth therapy but few emphasize the principal reason for this superiority, *viz.*, that penicillin effectively controls both the syphilitic infection and the intercurrent pyogenic infections, which before the days of antibiotics were the principal cause of death.

From February, 1945 to January, 1949 in the wards and out-patient department of the Hospital for Sick Children 58 infants with prenatal syphilis have been seen; 32 were treated with penicillin alone, 9 with penicillin combined with stovarsol and 13 with stovarsol alone; 4 were moribund on admission and died before any treatment could be instituted.

The schedule for penicillin therapy has not been constant during the four years. The first few cases treated were given 12,500 units sodium penicillin intramuscularly every 3 hours for 10 days. The first infant treated in this manner suffered from what was considered to be a moderately severe Herxheimer reaction characterized by extreme listlessness, fever and toxæmia. The fourth infant was a three-pound premature who appeared to improve until the fifth day when it developed a severe hæmolytic anæmia and died within 24 hours. Death was at that time attributed to a penicillin reaction, the dosage being unusually large—33,000 units a day per lb. body weight—but in retrospect the true cause was probably Rh incompatibility. Unfortunately no blood investigation was done. Thereafter, the dosage of penicillin was built up gradually, taking 4 days to reach the maximum of 100,000 units a day and this built-up dosage with some modifications has been adhered to up to the present time.

At present only 2 days are spent in the building up and in those cases suffering from a severe intercurrent infection on admission the full dose is given at once, since the danger resulting from an uncontrolled broncho-pneumonia far outweighs that of a possible Herxheimer reaction. Two infants in 1945 were given one injection daily for 10 days of 100,000 units in oil and beeswax; 23 hours after injection the penicillin blood level in one child was > 0.05 units and in the other < 0.025 units. The clinical and serological response in both was excellent. Crystalline penicillin G. was used during 1947 and 1948 and in October, 1948 procaine penicillin was started, the schedule being 300,000 units every 48 hours. Since then all patients have been treated in the out-patient department following two days' hospitalization during which spinal fluids have been examined, bone x-rays done and small doses of crystalline penicillin given on each hospital day. This method permits treatment of patients in the doctor's office, avoids the expense to the government of 10 to 14 days' hospitalization and also liberates a valuable bed for another infant.

Since February, 1945, when penicillin therapy was commenced at the Hospital for Sick Children much larger dosage has been given than that advised even in the most recent publications.

One case received 50,000 units per lb. total dosage; 7 cases received 50,000 to 100,000 units per lb. total dosage; 19 cases received 100,000 to 200,000 units per lb. total dosage; 7 cases received over 200,000 units per lb. total dosage. The largest dose given was 550,000 units per lb.; the average 138,000 units per lb. or 300,000 units per kilo.

Lenz[2] in 1944 gave 16,000 to 19,000 units per lb. Platou[3] in 1945 gave 7,000 to 15,000, but soon raised the amount to 28,000. Ingrahan[4] in 1946 started with 11,000 increased to 74,000 but concluded that the dose should be still markedly increased. Yampolsky[5] in 1946 started with 18,000 but increased to 32,000. Platou[6] in 1947 gave 18,000 but advised increasing to 45,000 per lb. Barber[7] in 1948 gave small dosage but repeated the courses two or three times.

The necessity for the build-up dosage has been a controversial one. It has been advocated by Stokes[1] Lenz and Ingraham[2] but frowned upon by Ingraham[4] in a later publication. In this series the build-up method has been employed and up to the present time there has been no cause for regret. On the contrary, one case quoted below suggests that the initial dose of 10,000 units given once on the first day was too large and may have been responsible for one fatal outcome.

The routine for stovarsol has been ½ tablet (0.25 gm.) a day for the first week, ½ tablet b.i.d. for the second week and ½ tablet t.i.d. until the blood Wassermann has been negative for one month.

Reactions.—Temperature elevations followed the initial dose of penicillin in one-third of the cases and did not seem to be dependent on the size of the dose. A definite Herxheimer reaction occurred in one case quoted above and a

possible one occurred in 1948 which resulted fatally. This was a 5 months' old infant in good physical condition who died suddenly after an initial dose of 10,000 units. Autopsy revealed no evidence of intercurrent infection and no obvious cause of death. A fatal reaction to penicillin seemed to be the only logical explanation. Reactions to stovarsol therapy consisted in an occasional skin eruption or a mild diarrhœa. No reaction was severe enough to warrant interruption of treatment.

Results.—There were 9 deaths in the series of 58 cases, a mortality rate of 15.5%. Eliminating the 4 infants who died a few hours after admission the death rate for the treated cases was 9%. Of the 41 cases treated with penicillin alone and with the penicillin-stovarsol combination 3 died, a mortality rate of only 7%. Of the 12 cases treated with stovarsol 2 or 16.6% died. Although the series is small, a comparison of these two mortality rates is very significant. Of the 9 fatal cases 7 died of broncho-pneumonia, 1 of hæmolytic anæmia (quoted above) and one as the result of a possible Herxheimer reaction.

Broncho-pneumonia occurred as a complication in 5 penicillin cases but only 1 died. This infant in spite of its pneumonia was given the built-up dosage and died on the 4th hospital day. I have no doubt that this death would have been prevented by giving full doses of the drug on the first day. After this experience the build-up routine was never employed when there was a complicating pyogenic infection. Broncho-pneumonia occurred as a complication in 2 stovarsol-treated cases and both died. These figures provide a further demonstration of the superiority of penicillin over arsenical therapy.

Serological response. — Of the 38 infants treated with penicillin, or the penicillin-stovarsol combination, who survived, all except 4 became serologically negative in a period varying from 6 weeks to 11 months following the completion of treatment. The average time of appearance of the negative Wassermann was 5 months. One case, that of a hydrocephalic with positive spinal fluid findings, had a serological relapse after becoming negative. This child was given a two months' course of arsenic and bismuth and the blood Wassermann returned to negative. Four infants treated in the last three months of 1948 have shown a satisfactory serological response, one from 1,360 Kahn units to 40 in 4 months, one from 320 to 40 in 3 months, one from 80 to 40 in 2 months and one from 250 to negative in 8 weeks. All surviving stovarsol-treated cases became negative in an average of 3½ months without any instance of serological reversal. The small number of cases (12) does not permit a fair comparison with the penicillin group.

Clinical response.—Signs of the disease disappeared with equal rapidity with both forms of treatment, the eruption in 7 to 8 days, rhinitis in 2 to 4 weeks and osteochondritis in 3 to 5 months. In only the cerebrospinal cases, which constituted 25% of the group, did penicillin appear to be more effective than stovarsol. Two cases of syphilitic hydrocephalus seen in 1945 were given both intramuscular and intrathecal penicillin with complete clinical and serological cures in both, although one (quoted above) suffered a temporary serological relapse. Since 1945 the dose of penicillin has been doubled in every case showing positive spinal fluid findings and this has obviated the necessity for the use of the drug intrathecally and avoided any danger attendant upon this route of administration.

The increased permeability of the blood-spinal fluid barrier in infants as shown by Katz[8] emphasizes the importance of early recognition of cerebrospinal infection.

Treatment of the older child.—Effective treatment of the child over one year of age has always been a problem. Two or three years of unremitting treatment with arsenic and heavy metal resulted in cures in only 35 to 40%. Many Wassermann-fast cases were encountered and serological relapses were common. It was hoped that the use of penicillin would offer greater hope of serological cure.

In the last three years 28 older children have been so treated: 3 were given a total dosage of 1 to 2 million units; 1 was given a total dosage of 4 million units; 24 were given a total dosage of 5 to 10 million units.

Thirteen children returned to isolated rural districts following treatment and all efforts to obtain information as to their condition have failed. It has been possible to observe the progress in 15; 8 have been followed for periods over 1 year; 5 for 6 months to 1 year and 3 for less than 6 months; 11 showed a declining Kahn titre; 9 to the level of 4 units; 5 to the

level of 20 to 40 units; 1 was unchanged and only 1 became negative. This was a child of only 18 months and the serological reversal was not unexpected. It is an accepted axiom that the younger the child the more striking is the response to treatment. The average age of 7 children receiving 10 million units was 10 years. In 1 there was no reduction in the Kahn titre 10 months after treatment; in 3 there was a reduction to 4 units and in 3 to 40 units. It was noted that a greater length of time was required for any notable reduction of reagins than was the case with infants under 1 year.

Several children, after observation for 9 to 12 months, were started on arsenic-bismuth routine with a further reduction in the Kahn titre. The impression formed as a result of observation of this group was that penicillin treatment in massive doses in the older child, followed by arsenic and heavy metal therapy probably shortens the total period of treatment required to effect a satisfactory serological result.

The clinical response was very similar to that formerly obtained with arsenical treatment. Clutton's show very slow improvement; deafness is not appreciably affected; in cerebrospinal syphilis the activity of the disease, as evidenced by the cell-count and total protein, is arrested more rapidly than with arsenical therapy; the results in interstitial keratitis are uncertain. The first three children with this manifestation given 10 million units showed a rapid improvement. A fourth child admitted with hydroarthrosis of one knee-joint and no eye involvement developed, during his course of penicillin, fluid in the other knee-joint. This was not unexpected, since the condition is nearly always bilateral, but two weeks after completion of treatment he developed bilateral interstitial keratitis. I have the records of one other similar instance reported by a general practitioner and Yampolsky[5] reports an identical occurrence in his series. A possible explanation is that they are examples of a delayed Herxheimer reaction. The statement of Stokes[1] that the results of penicillin treatment of interstitial keratitis are equivocal but at times dramatic coincides with the impression formed in the author's series.

In conclusion one can predicate that penicillin therapy of the early stage of pre-natal syphilis is superior to any other form of treatment. Further experiments with dosage schedules and drug combinations are necessary before an authoritative statement can be made concerning the treatment of the older children.

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Medical Arts Bldg.

A METHOD OF TREATMENT OF URETHRAL STRICTURES

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URETHRAL stricture has been with us since time immemorial and the treatment of this condition is still one of the most vexing problems in urology. Since the advent of the sulfa drugs and the newer antibiotics such as penicillin and streptomycin the incidence of this condition has decreased tremendously. However, in any large general hospital there are still many patients attending the clinics with strictures dating back anywhere from five to thirty years.

These patients constitute a great problem in therapy, mainly due to the fact that they will not attend clinic regularly and it is virtually impossible during their infrequent visits to maintain their strictures at an adequate calibre. A certain number will not return for periods up to one or two years and here at the Montreal General we receive from 15 to 20 admissions per year to our urology service with filiform strictures and varying degrees of urinary retention. It is in this hospitalized group that we have our greatest opportunity to obtain maximum or at least reasonable dilatation and the hope of maintaining a more adequate calibre following discharge. However, even with maximum dilatation it is amazing how rapidly the lumen of the stricture closes down again. Even a week's interval between dilatation and return to clinic will often

see the calibre return from French 24 to French 16.

Our practice in the past has been to dilate all strictures to maximum capacity under spinal anæsthesia and leave an inlying catheter for two days. The patients were then discharged and reported to clinic in one week. However, as stated previously, even with such a short interval, many of the strictures had contracted several sizes. In many patients with very hard strictures it is impossible, at one sitting, to dilate further than F 16 without doing an internal urethrotomy, with its added trauma. When the catheter is removed on the second day the majority of patients will void fairly well, even if only dilated to F 14-16 and it is very difficult to persuade them that they require another anæsthetic and further dilatation prior to discharge. Further, the majority of strictures today are seen in elderly men who do not stand anæsthesia and extreme dilatation at all well. Since most of these patients have a marked pyuria and some degree of urethritis, we have the added danger of septicæmia and periurethral infection during maximum dilatation, with or without internal urethrotomy.

In the summer of 1948 it was noted on the urological service, in cases of stricture with inlying catheter, that on removal of the latter it was quite loose, even though it had been firmly grasped by the stricture at the time of insertion. It was then suggested that possibly there was more rapid softening and absorption of the fibrous tissue with the catheter *in situ*, than in cases where no catheter was used and the patient urinated over a traumatized urethral mucosa. It was further suggested that possibly by simply replacing inlying catheters, at 2 to 4 day intervals, with progressively larger sizes, a gradual gentle dilatation of the stricture might result. This would obviate internal urethrotomy and consequently excessive trauma during maximal dilatation; would require at the most, only one anæsthetic; would allow badly infected bladders to be thoroughly irrigated and drained; and by not allowing the patient to void on removal of the first catheter it would be easier to persuade him to remain in for more thorough dilatation. The majority of our patients tolerate Foley or soft latex catheters very well, and since they are up and about the ward with no prospect of further "operation", they are usually content to stay for the necessary period.

When a patient with urethral stricture is admitted, our procedure at present is as follows: under local anæsthesia an attempt is made to pass a filiform and if this is successful the stricture is dilated with either LeFort's or Phillips' followers to F 14-16 and a small soft rubber catheter inserted. In cases requiring anæsthesia the same procedure is carried out, no attempt at maximal dilatation being done. From then on we simply replace the catheters with progressively larger sizes at two to four day intervals. All patients receive routine penicillin and low doses of a sulfa compound. We have used this method on seven patients in the past few months with satisfactory results. The hæmorrhage, hyperpyrexia and chills formerly seen have not been observed. In addition the tendency to rapid contracture following discharge has been absent. The following three cases may serve to illustrate the method:

CASE 1

J.R., aged 66. The time intervals here are longer than usual since the patient was primarily a surgical case. He had a meniscectomy on October 7, 1948. Postoperatively he was unable to void and was found to have a filiform stricture 2½ inches behind the meatus. Under local anæsthesia this was dilated to F 16 and a F 12 soft rubber catheter was inserted with difficulty using a mandarin. After four days a F 16 catheter was inserted and replaced four days later with a F 18. This remained *in situ* until November 1, at which time he was transferred to the Urological Service. On November 2, he was taken to the operating room and without further dilatation a F 24 panendoscope was passed to the bladder without difficulty.

In the follow-up clinic F 24 sounds pass quite easily and so far there has been no evidence of contracture.

CASE 2

J.O., aged 66. This patient had a stricture of long duration and had not been dilated for eight months. He came to clinic on January 16, 1949, with urinary retention, and with moderate difficulty the stricture was dilated to F 16 and the bladder drained. However, following dilatation he was again unable to void and was admitted to hospital on January 17. On admission a F 14 soft rubber catheter on a mandarin was inserted with moderate difficulty. This remained in place for three days; then a F 16 for two days and finally a F 20 Foley catheter passed to bladder easily without a stylet. This was removed after four days and he was discharged on January 27. On the two following weeks in Clinic F 26 sounds passed quite readily to bladder.

CASE 3

T.B., aged 72. This patient was originally admitted to the nose and throat service for epistaxis, but while in hospital developed acute retention and on questioning gave an old history of stricture. He was found to have a filiform stricture and under local anæsthesia he was dilated, with difficulty, to F 14. A F 8 soft rubber catheter was the largest which could be inserted and this was left in place. After three days the catheter

was quite loose and was replaced with a F 14 using a mandarin. In three days this was replaced with a F 18 on mandarin and after a further three days a F 20 soft rubber catheter would pass to the bladder without a stylet.

In all these cases only minimal dilatation was done, but they all show the rapid "self-dilatation" without further trauma.

Our series is quite small, but they all followed the same pattern and we feel that the results are good enough to warrant a continuation of the method. The only other reference to inlying catheters in the treatment of strictures, that we have found, is that of Davis and Lee.[1] They, however, do an internal urethrotomy, then dilate to F 26-28 and leave a retention catheter for twelve days to promote epithelialization of the cut edges of the stricture. They claim much more lasting results than in cases without the catheter. We feel that the same result can be accomplished without the added trauma of urethrotomy and maximal dilatation.

SUMMARY

A simple method of dilatation of urethral strictures is described. The advantages, we feel, are; doing away with anæsthetics in most instances; the lessened trauma, especially important in elderly patients; the lessened tendency to rapid contracture; the decrease in bleeding and periurethral complications and the chance to clear up the pyuria by daily irrigations. The greatest disadvantage is the length of time spent in hospital. However, if we can achieve more lasting results we feel that this becomes of much less importance. The possibility of using the method with inlying Foley catheters in ambulatory patients has been suggested and is at present under consideration. We will not, of course, be able to assess the permanency of this method for some time, but we feel that the early results are superior to those achieved by former methods.

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TRAVEL NOTE—We have been informed by one of our members that the special bureau for visiting physicians which is being operated this summer by the French Medical Association in Paris is most helpful. The charming young lady in the office is prepared to help in obtaining anything from hotel accommodation to theatre tickets and University visits. The office is operated under the name of O.F.A.M.M. and is handily located at 60 Blvd. de Latour Maubourg.

CHRONIC DUODENAL ULCER

With Reference to Hormonal Influences and Surgical Treatment

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SURGICAL treatment is indicated in the management of chronic duodenal ulcer when it becomes complicated by acute perforation, severe or recurrent hæmorrhage, chronic penetration or stenosis, or in other words, when it fails to respond to medical treatment. To the surgeon, faced with the responsibility of operating on patients not only seriously debilitated by the disease but possessed also of deeply penetrating, densely adherent ulcers, it must often seem that recognition of the failure of medical treatment or the complication of penetration is somewhat tardy. The emphasis placed on general factors, especially nervous tension and their importance in perpetuating symptoms, has led to considerable improvement in the general medical management of ulcer patients, and may be expected with some confidence to protect an increasing number of patients from the development of surgical complications. It must not be allowed, however, to divert attention from the local characteristics of peptic ulceration and their effect in preventing healing. Experience has shown that once an ulcer has extended through the wall of the duodenum and involved an adjoining viscus in such extension, healing is unlikely in spite of the most detailed conservative care. Moreover, persistence with such treatment in the face of advancing symptoms, continued ill health and economic suffering is the cause, very often, of the nervous irritability which it seeks so ardently to allay.

DISCUSSION

The uncertainty which exists often in the management of this disease results largely from the confusion which prevails in regard to its etiology, and partly from a lack of full appreciation of the pathology. In spite of countless animal experiments and much clinical observation, the most that has emerged, in regard to etiology, is the general agreement that an excessive or continuous secretion of acid gastric

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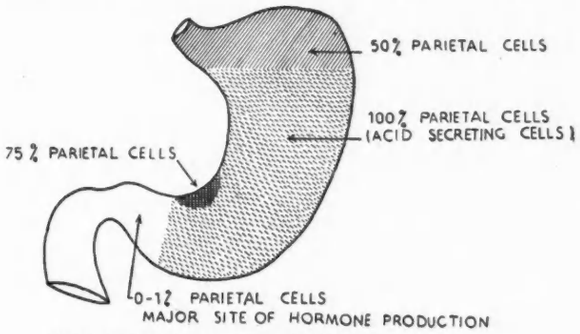
juice is the major factor in determining the chronicity of the ulceration. What brings about this continuous or excessive secretion? There are many who believe excessive neurogenic impulses, arising from central cerebral stimuli and conveyed by the vagi nerves, to be responsible and that acid is the factor concerned in the ulceration *ab initio*. Exponents of this theory do not always explain what initiates the excessive cerebral stimuli in man or why they continue during the hours of sleep.

Physiological facts, with regard to the presence and effects of hormonal stimuli should not be disregarded[1] (see Fig. 1). A hormone is produced in the stomach, the duodenum and, to a small extent, in the jejunum in response to the products of digestion (especially proteoses and peptones), which is a powerful excitor of acid secretion. The *modus operandi* of this double



FROM BEST & TAYLOR (4 EDITION) P.444.
AFTER BERGER, AM. J. OF ANAT. 1934, 54, 87.
FIG. 1

mechanism is as follows: the neurogenic impulse is evoked chiefly by the sight, smell, taste and even thought of food. It subsides soon after the stomach is filled, and in the early phases of digestion. The hormonal impulse, excited as it is by the products of meat digestion, ensures a continuous flow of acid gastric juice throughout the concluding phases of gastric digestion. It is thus of particular importance to man who eats relatively slowly and retains the meal in his stomach for three or four hours. Therefore, it might be supposed that abnormal acid secretion is in man an expression of hormonal, rather than of vagal overaction. Ogilvie,[2] recently, has also expressed a similar view. I believe further that such disordered hormonal action is possibly a response to the presence of mucosal ulceration rather than an initial cause. Expressed differently, it is the duodenal ulceration which acts as the stimulus to continued gastric secretion. By its irritating effect, the acid gastric juice aggravates the ulceration and thus sets up a vicious circle. It is a characteristic of mucosal tissues to provide an increased secretion in the presence of irritation or ulceration. Witness the increased secretion from the mouth in the presence of an oral ulcer, and the increased secretion from the rectal mucosa in the presence of inflammation or ulceration. Indeed, in the stomach, increased secretion (with high, normal, or even abnormally high acid levels) is often encountered in relatively early cases of carcinomatous ulceration.

The concept that a high level of acid secretion may be a secondary effect rather than a primary cause was initiated by these observations and stimulated by an experience that I had some eleven years ago with three cases of very active gastrojejunal ulceration, following a Finsterer type of exclusion operation in which, although a high gastric resection was performed, the pyloric antrum and the duodenal ulcer had been left behind. Each of these cases was in severe pain, the acid level was high, and one had suffered a serious hæmatemesis. Operating upon the first under difficult circumstances, further resection was deemed too dangerous because the anastomotic ulcer was very large and adherent. As continued activity of the original ulcer was evident, it, together with the pyloric antrum, was resected with results which were dramatic. The acid level dropped, pain was relieved considerably, and the stomal ulcer subsequently healed. This procedure was followed in the other two cases with similar results. These patients returned to their usual environment and occupation after operation, with their vagus nerves intact, but with the major site of hormonal production removed.

Further support to the view that it is the ulcer which acts as a possible stimulant to abnormal hormonal action leading to excessive acid secretion is provided by the observations of Wolf and Wolff[3] in experiments on their subject "Tom". They were able to show that a breach in the gastric mucosa excited, initially, an excretion of mucus which covered and protected the abraded surface. If, however, the mucus were continuously sucked away, an increased flow of acid occurred and the abrasion became, eventually, a peptic ulcer.

Peptic ulceration has been presented recently as a psychosomatic disorder, but without wishing to detract in any way from the value of expert psychiatric analysis and treatment

where indicated, it is problematical whether such an explanation will satisfy the majority of cases. The wood has to be distinguished from the trees. It is a matter of ordinary observation that the victims of chronic gastrointestinal disease often develop marked anxiety and other complexes. Such is, indeed, the case with duodenal ulcer patients, where for one reason or another, medical treatment has been ineffectual and unduly prolonged. Furthermore, while fully cognizant of the frequency with which duodenal ulceration is encountered in tense, highly-strung individuals, it has been my fortune in a personal series of nearly three thousand operations for duodenal ulcer to encounter its occurrence in a people who temperamentally are remarkably placid.* Ninety-five per cent of these patients were gravely undernourished and often further debilitated by such conditions as ankylostomiasis and amœbiasis. The tense individual may be characterized as possessing a gastric and upper duodenal mucosa which is recurrently hyperæmic and highly susceptible to abrasion and erosion. The debilitated subject, on the other hand, possesses a mucosa which, through malnutrition and avitaminosis, is perhaps even more liable to erosion. In either instance, failure of the erosion to be sealed efficiently by mucus may call forth a continuous flow of acid whereby it is converted eventually into a chronic ulcer. The sites at which peptic ulcers commonly occur, *viz.*: the lesser curvature of the stomach, the posterior wall of the first part of the duodenum and along the line of a gastrojejunal or gastroduodenal anastomosis, are just those regions where the mucosa is less redundant than elsewhere in the foregut, and an erosion not only is less easily sealed by mucus but also is more liable to irritation by food as well as by acid.

PATHOLOGY

A chronic peptic ulcer, if not brought soon under control, extends through the duodenal wall, thereby destroying a variable degree of its length and breadth. With the occasional exception of the duodenal ulcer "occulta" which occurs in the second part, the ulcer lies on the posterior wall of the first part of the duodenum in approximately 80% of the surgical cases. Extension from this situation always brings about adherence to the pancreas, or a variable degree of penetration. In 3 cases of this series, the ulcer had perforated into the gall bladder, and in 7 into the common duct. In 11 other cases, a mild degree of jaundice was present, at the time of examination. Penetration into the common duct might occur more often but for the fact that *pari passu* with extension of the ulcer there is a well marked inflammatory reaction which results in such considerable thickening of the pancreas and surrounding tissues as to protect the duct. The common association of a localized pancreatitis, and of chronic cholecystitis, with a well established chronic ulcer, should not be forgotten, and is one reason why surgery should not be indefinitely delayed. There is also, at any time, a real risk of acute perforation (in the case of a posterior wall ulcer usually by extension around the superior border) or of serious hæmorrhage. It is difficult and rare for a chronic perforating ulcer to heal, and it can only do so with narrowing, distortion, and reduction in length of the first part of the duodenum.

TREATMENT

Surgical treatment of chronic duodenal ulcer has for its objects cure or removal of the ulcer, as well as relief from such complications as hæmorrhage, penetration, or stenosis. Ideally, it must not only leave the patient comfortable and free from pain, but also restore him to such a degree of health as will enable him to return to his usual occupation. It has to be remembered that the patient, after operation, returns almost invariably to those conditions and circumstances of life, habit and diet under which the ulcer was acquired. On the basis of experience, properly applied surgical therapy may be expected to relieve completely 60% of patients operated upon, and to relieve, almost completely, a further 35%. The remaining 5% will continue dissatisfied but except for the occasional instance of gastrojejunal ulceration will not be worse off than before operation. The majority of unsatisfactory results are made up of introspective, highly neurotic individuals, whose pain threshold is low, and in whom a small chronic, uncomplicated ulcer is found, usually on the anterior wall of the duodenum. These cases are the utter failures of medical treatment, and surgery does little more than remove a focal point of pain. The general disability continues.

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The three most important operative procedures are: (1) gastrojejunostomy; (2) vagotomy; (3) High subtotal gastrectomy.

1. *Gastrojejunostomy* is indicated chiefly when healing of the ulcer has resulted in pyloric, or more properly duodenal stenosis. The problem in such cases is not the cure or relief of ulcer; it is, simply, the relief of gastric obstruction. The results are excellent. For elderly patients debilitated by the effects of the ulceration or other disease, and in whom the acid response is low, it may also be considered an acceptable procedure. Symptoms are thereby relieved at little risk, whilst the chances of anastomotic ulceration are very slight. Another and more recent indication for gastrojejunostomy is the relief of gastric stasis and atony subsequent to vagectomy. As practised under the circumstances for which it is properly indicated, the stoma should be not less than three and one-half inches long, and preferably should be placed on the posterior wall of the body of the stomach, to lie in any convenient direction. The proximal loop of jejunum should be short and placed near the lesser curvature of the stomach with the distal loop at the greater curvature of stomach. In cases of obstruction, the stoma initially has to be large to allow for the subsequent contraction which follows relief of the obstruction, and in cases where vagectomy has been done, it should be large to overcome stasis and atony by allowing at least some degree of emptying through gravity.

2. *Vagotomy.*—Considerable interest has been centred in this procedure since its introduction by Dragstedt and Owens[4] in 1943. Much credit is due these investigators whose work has stimulated such interest, and who have shown that division of the vagi nerves must be effected in the vicinity of the œsophageal hiatus, if total section is to be secured. A transthoracic or a trans-abdominal approach may be used. Approached transthoracically, the operation is technically easier and, originally, but inaccurately, it was claimed that total nerve section could be more easily achieved by this approach. An important disadvantage also is that it does not permit actual examination of the ulcer and precise determination of its pathology. It is, therefore, possible that nerve section via this route may be done when a mistake in diagnosis has been made and there is no ulceration, or some other condition is present which requires quite different treatment.

Approached via the abdominal route, section is more difficult, but if executed after the manner of Dragstedt, is perhaps more surely total. In addition to isolating and sectioning the two main nerves as they emerge through the hiatus in close relation to the œsophagus, it is essential to look for other branches which may traverse the diaphragm outside the hiatus or may be buried in the wall of the œsophagus. There will be circumstances, however, in which even the most experienced operator may be pardoned for failing to achieve total division. Recognition of the effects of moderate degrees of obstruction, once the stomach has been paralyzed in this manner, has led to a more or less general adoption of trans-abdominal vagectomy, so that a gastrojejunostomy may also be done if the condition of the ulcer is considered to warrant it.

Successful vagotomy lowers the level of gastric acidity and relieves immediately the pain of the ulcer. It has other less desirable results. The stomach is rendered so atonic that gastric stasis and gastritis of variable degree develop. The not infrequent foul-smelling eructations, occasional vomiting, and diarrhœa (possibly infective and resulting from the products of gastric stasis) indicate the onset of what might be called a new syndrome—the syndrome of vagectomy—which requires gastrojejunostomy for its relief.

The immediate and even long-lasting relief from pain which follows this operation is in some respects a disadvantage, for it does not necessarily imply that the ulcer has healed. While it is conceivable that relatively early uncomplicated ulcers may heal, following the removal of an important irritant such as gastric acid, it is no less conceivable that many deeply penetrating ulcers may fail to heal and the patient continue to be heir to their possible complications. In addition, there is some uncertainty with regard to permanency in the reduction of acid levels. Partly for these reasons, and chiefly because I have been well satisfied with the results of high subtotal gastrectomy, I have hesitated to adopt vagotomy to any extent in the treatment of duodenal ulcer. Its chief indications, at present, would seem to lie in certain difficult cases where gastrojejunal ulceration and/or hæmorrhage have followed subtotal gastrectomy or gastrojejunostomy, and as an adjuvant to

gastrojejunostomy in those cases it is deemed unsafe or impossible to resect.

3. *High subtotal gastrectomy.*—If properly performed, this operation fulfills the requirements enunciated at the beginning of this section. The ulcer is removed, the patient is freed from pain and is so little incommoded that hard manual labour may be resumed if such is the normal occupation. Indeed, a high subtotal gastrectomy for the relief of chronic duodenal ulcer is one of the most satisfactory procedures in the realm of elective surgery (Fig. 2). This opinion is based upon the results obtained in 1,083 operations in which two principles have been followed: (*a*) *Resection through the duodenum beyond the ulcer,* and thus removal of the ulcer. This is possible and can be done with complete safety in all but the very rare case in which the ulcer lies in the second part of the duodenum. (*b*) *Resection through the stomach at a constant high level.* The lesser curvature is sectioned just below the œsophageal opening and the greater curvature at the second lowest of the short gastric arteries. The amount of stomach removed varies from 75 to 90%, depending upon its size. It is customary to define, by percentage and weight, the amount of stomach resected. While such a definition is not without value, it should always be coupled with precise information as to the amount which is left behind. Visick[5] recently has emphasized this point. Whatever amount is removed, it is the behaviour and function of the remaining gastric stump by which the success of the operation is determined. With resection at a properly high level, the "factory" in which most of the acid is produced and the hormone-bearing area which stimulates its production are removed, leaving a gastric stump capable of producing acid in such small amount as may readily be neutralized by reflux from the jejunum.

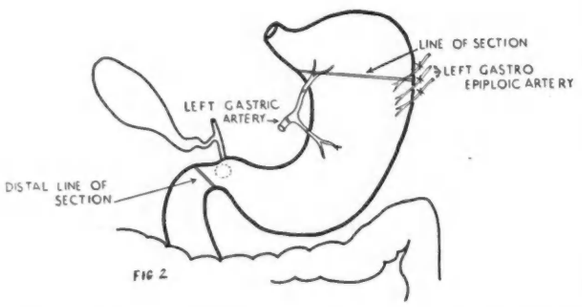

FIG 2

Two-stage gastrectomy.—A two-stage gastrectomy may be desirable in certain cases, when the size and circumstances of the ulcer are such as to make it appear irremovable. At the first stage, a Finsterer exclusion type of subtotal gastrectomy is done, the distal section being made through the pyloric antrum about two and one-half inches proximal to the pylorus. About four weeks later, the abdomen is reopened and the pyloric antrum, together with the ulcer, is removed. It is surprising to what degree the œdema and inflammation around the ulcer will have subsided and how relatively easy this second stage removal is. To the experienced, the necessity for this type of procedure is rare, and whenever it presents itself, it may be used as a method of training assistants in the operation.

In the after-care of these patients, I have found it useless to forbid tobacco and alcohol, for if the urge is great they will be taken in spite of all advice, and, psychologically, it is poor policy. Nor is any special diet prescribed. It is of interest to record that South Indian patients returned with evident enjoyment to their customary curry and rice diet on the thirteenth postoperative day.

In this series of 1,083 resections, extending over a period of 14 years, there have been 32 deaths, or an operative mortality of just under 3%. In the first 226 cases, completed at the end of 1937, there were 13 deaths, whereas in the remaining 857 cases there were 19 deaths.

The causes of death were as follows:

TABLE I.

226 CASES (OF SERIES TO END OF 1937)

Shock	3
Heat exhaustion	3
Leakage of duodenal stump	1
Necrosis of stomach wall at the greater curvature just above the anastomosis	1
Bronchopneumonia	2
Coronary occlusion	1
Acute dilatation of stomach	2
	13

TABLE II.

857 CASES (OF SERIES TO END OF 1948)

Heat stroke	3
Coronary occlusion	6
Pulmonary embolism	2
Acute dilatation of stomach	1
Massive atelectasis	1
Postoperative tetanus	1
Cerebral hæmorrhage	1
Gastric hæmorrhage (? hæmorrhagic diathesis)	1
Bronchopneumonia	3
	19

The large majority of these patients were in poor general health and were operated upon without the benefit of blood transfusion. In India heat exhaustion was found to be a complication liable to follow any major surgical operation done during excessively hot weather (with shade temperatures up to 114°). With avoidance of major elective surgery, so far as was possible, during the month of May, no patients were lost from this cause after 1938. Acute dilatation of the remaining stomach has not occurred since the routine use of postoperative gastric suction eleven years ago. Leakage of the duodenal stump occurred in one patient in whom inversion of the suture line was probably under slight tension as a result of inadequate dissection of the duodenum. This error in technique has not been repeated. It is my conviction that the duodenal wall itself is the best tissue with which to close the duodenum, and that any method which relies partly on duodenal wall and partly on the neighbouring pancreas, other adjoining tissue or omentum to effect closure, is likely, sooner or later, to give trouble. Ambulation was relatively early and at the will of the patient in the majority of cases. In the past two years it has been insisted upon from the day of operation. The suture material for anastomosis and abdominal wall has been fine chromicized catgut. Wound disruption occurred on two occasions and was due in each case to a combination of mild wound infection and cough.

It is considered that the operative mortality would be less than 1% if failure of an ulcer to heal or the development of incurable complications, in spite of adequate medical care, were more readily acknowledged or recognized than they often are. Moynihan's dictum of making surgery safe for the patient has been fulfilled. The modern dictum of making the patient safe for surgery, so far as chronic duodenal ulcer is concerned, is strained by subjecting him for years to a therapy of rest, diet, and antacids which involve continued physical and economic suffering and provides the surgeon with clinical problems of the highest order.

CONCLUSION

The etiology of chronic duodenal ulcer has been discussed and the suggestion made that the excessive acid secretion seen in cases of active duodenal ulceration is a phenomenon secondary to the presence of the ulcer and not necessarily the primary factor. The pathology of the ulcer is such that if not brought soon under control, its extension beyond the duodenum is the most likely reason for failure of conservative care. Present day enthusiasm for the operation of vagotomy is so reminiscent of the enthusiasm which first greeted the operation of gastrojejunostomy that the procedure has been examined critically and its most likely indications stated. It is considered that subtotal gastrectomy continues to be the procedure of choice in the surgery of chronic duodenal ulcer.

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RÉSUMÉ

L'auteur passe en revue les indications opératoires de l'ulcère duodénal et déplore la prolongation du traitement médical lorsque l'ulcère s'est propagé jusqu'à un organe voisin. Sheppard émet l'opinion que l'action hormonale désordonnée de l'estomac est une réponse à la présence d'une ulcération de la muqueuse plutôt que la cause initiale. L'ulcère duodénal dans 80% des cas est situé sur la paroi postérieure et l'intervention chirurgicale doit être pratiquée avant qu'il ait eu le temps de produire des complications. Dans 60% des cas on peut s'attendre à d'excellents résultats, dans 35% à un soulagement presque complet et dans 5% à une faillite totale. L'auteur résume les différentes interventions et leurs indications. La gastro-jéjunostomie est conseillée dans les sténoses pyloriques cicatricielles. La vagotomie remise à la mode par Dragstedt peut être faite dans les ulcères et les hémorragies survenant après les gastro-jéjunostomies ou les gastrectomies subtotales, et comme un adjuvant des gastro-jéjunostomies. La troisième opération, la gastrectomie subtotale haute est considérée comme l'opération de choix. L'auteur en discute les différentes techniques, les échecs et les statistiques post-opératoires. YVES PRÉVOST

"The intellectual path to human brotherhood is not to be found in a doctrinal simplification of historical cultures. . . . Nothing must be lost from our wonderfully varied heritage. But all cultures must be made common property, or, at least, they must be made permeable by each other instead of their neglecting or rejecting, sometimes even hating and despising, one another. The first goal to be attained is sympathy, followed by mutual enrichment; not a collection of samples, nor a catalogue, nor a mixture of mediocrities, nor a sort of highest common factor."—Dr. Torres Bodet.

SOME EXPERIENCES WITH THE AFTER CARE OF POLIOMYELITIS*

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THIS paper is based on the experiences obtained in carrying out the after treatment of poliomyelitis over a period of some twenty years under the ægis of the Department of Health of the Province of Alberta. The number of cases cared for numbered about a thousand—1,032 to be exact — and represented only those cases treated in Edmonton. It does not represent all the cases in Alberta during the same period as the figures of the Department of Health over the same twenty years total 2,043.

In the fall of 1927 Alberta was rudely awakened by the onset of an epidemic of poliomyelitis in which 355 cases were reported. Except for the widespread attack of influenza in 1918 nothing like this had been experienced before in this relatively young and rather sparsely settled Province. In fact at that time the proportion of cripples to the rest of the population in the west was very low and we were only beginning to get acquainted with the problems of the aged, the indigent, and the disabled. Consequently there were no facilities at hand to take care of any large number of cases that might result from such an outbreak from this new and strange disease. With such a situation it is no wonder that the people began to get panicky and the Provincial Department of Health was appealed to in order to obtain some aid. As a result the Provincial Special Hospital was built, nurses and physiotherapists collected and an organization set up for the handling of the after care of the disease. The institution was opened early in 1928 and later became part of the University Hospital. The diagnosis and early treatment of the cases was the responsibility of the family and the family physician, and when they came out of their quarantine period this new service was prepared to accept the patient for treatment. At first the patients paid what they could, but since April, 1948, the Provincial Government has borne all the costs of the treatment.

As you know, poliomyelitis is an acute infectious disease, the effects of which are most marked in the central nervous system. It is a lower motor neurone lesion giving rise to a scattered flaccid paralysis affecting muscles or groups of muscles without loss of sensation. It has a tendency to spontaneous recovery which may continue for a period of two years or more. It seems to cross Canada in waves from west to east, invading a province a year so that in nine or ten years we may expect to have a new flare-up. The increase of cases is usually more marked in the late summer or early fall and the appearance of a good sharp frost seems to shut down on the appearance of fresh cases. It is essentially a disease of early life though it does attack adults. The adult, however, does not have such a good chance of surviving the acute attack as the younger people. This may really be a blessing in disguise because the persistence of a marked degree of paralysis in an adult is a disaster. All races and creeds seem to be susceptible to the disease except the full-blooded North American Indian. On one occasion it was thought that a candidate had appeared who might be used to refute this last statement but he turned out to be a half-breed.

The signs and symptoms seem to vary considerably from year to year. In some years the muscle tenderness is the most outstanding and distressing sign, in others it may be the predominance of gastro-intestinal symptoms as demonstrated by obstinate constipation. This requires prolonged and constant attention because we do not want to overwork the weakened musculature of the intestinal tract by the use of purgatives which act on this tissue. Our routine procedure, with variations of course, has been to lubricate the intestinal contents at the upper end so that they may pass along to the level where they may be syphoned off with enemas. Bladder involvement is bothersome at times but in all our cases function has returned in a relatively short time with the usual palliative methods and no case has been on tidal drainage. In this series of cases, of course, we have had our qucta of patients who have been in the iron lung. The majority of these are out of this apparatus before they arrive at the University Hospital.

As regards complications, we have been able to list most conditions to which man is susceptible. The children's diseases probably head the list but we have had our quota of appendicitis and nephrolithiasis. The most interesting complication is that of pregnancy.

* Read at the Annual Meeting of the Royal College of Surgeons of Canada, Ottawa, November 26, 1948.

This requires close co-operation between the obstetrical and orthopædic services. Strange to say all these women have done wonderfully well in spite of their polio. Probably that is because pregnancy is a physiological not a pathological process.

In some years the muscle tenderness is a most persistent sign and in other years it is not so marked. When present it is taken as an indication that the lesion in the spinal cord has not yet reached a finality. Therefore, it is a sign that the patient is to be kept at rest and no active treatment is carried out. Should tenderness recur under treatment rest is substituted until it has disappeared. Failure to do this prolongs the period of tenderness and discomfort to the patient. One of the ideals of the treatment is the prevention of deformity. In the early stages if posturing the patient, to conform to these ideals, produces pain and tenderness in the muscles then the position must be changed until the patient is comfortable. Not recognizing this fact extends the period before active treatment can be undertaken. Most of the rules for the posturing of patients have been evolved from the care of young children. As you know, children can adapt themselves quickly to any posture for an almost indefinite period without discomfort. This is not true in the case of adults. They have acquired the secondary physiological curves of the spine and placing these people on fracture boards or Bradford frames without proper support to the lumbar lordosis brings us back to the days when the postoperative painful back was so prevalent. Particularly in women must one allow a certain amount of plantar flexion of the feet on account of the usual shortening of the female heel cord. The placing of a small support under the knees will greatly add to the comfort of the patient by easing the strain on the knees and lumbar spine. It is for this reason we have found that the strict Kenny position as laid down for children is impractical for adults and I think one of the reasons why in so many instances we have seen the period of muscle pain and tenderness extended beyond the usual time.

Besides the rest and the posturing to relieve pain we are greatly aided by the application of moist heat. Years ago moist heat was applied through the medium of the old hot pack such as was used in the treatment of nephritis. The treatment of this disease must have changed because the majority of the present day nurses have never seen or heard of such a device. The present fashionable method of applying heat is by means of the Kenny packs. A very strict ritual is laid down as to when and how these packs must be applied and how often. They relieve the symptoms in some patients while in others they have little or no effect, and in fact some patients are made more miserable by what one might call a "pack dermatitis". The Kenny treatment, contrary to public opinion, is no cure of polio but it has undoubtedly stimulated interest in the after treatment of the condition so that as a result we are more likely to notice the onset of any deformity and take immediate measures to correct it. It is comforting to the friends and relatives, because at the time the patient has just fallen a victim to this dread disease, there is action and lots of it.

In the last of the 1920's and early 30's we were busily engaged in the manufacture of serum which was hailed as the real stopper to the disease. Quantities of this serum were given to cases which were not polio and the results were charged up as cures. These cases, before the country became polio-conscious, would have been put to bed and given a dose of castor oil with the same results. The serum was not a success and was abandoned. Later came the spraying or inoculating the nasopharynx with much discomfort to the children and no appreciable improvement in the situation. We have had the pool treatment, which has gone out of fashion at the present time to a great extent. It is still useful in treatment and in working out some of the muscle reactions in the hips, pelvis and lower back. Many a limp which is extremely hard to diagnose may be analyzed by floating the patient in the water with head supported and having him go through the motions.

All our patients who have been in the iron lung seem to have been adolescents or older people. People who are candidates for the iron lung have an extremely high lesion and as a result have a very extensive paralysis involving, arms, legs and trunk. The longer these patients have to stay in the lung the worse the ultimate result because it means very slow, if any, recovery of the lesion in the spine. All our good results have only been in the ap-

paratus for relatively short periods. In the series there are some five or six cases who were in the lung for a varying number of months and they are all total disabilities. They are unable to move under their own power and in some cases unable to even feed themselves. They, of course, require the services of an attendant. The removal of the patients from the iron lung must be done on a careful routine and any complaints carefully listened to. The fear of having one's wind shut off is a very great one. It is frequently reported to you that this patient, or that one, is not sleeping well and that sedatives do not seem to have any effect. The reason for this is that they are afraid to go to sleep in case the breathing stops. A change in the schedule of being out of the apparatus will often settle the morale and allow the patient to get the needed rest. If they have graduated from the iron lung, keeping it in the patient's line of sight will accomplish the same result.

Rest is one of the most valuable therapeutic agents that we have at our disposal. It is one of the easiest to order and one of the hardest to carry out. One can apply rest locally or generally and too often we have concentrated on resting the paralyzed muscle or muscle groups and allowed the patient too much activity, both mental and physical. It is wonderful to see how a paralysis in the upper extremity will improve with a month of general rest in bed. Local rest is accomplished by the use of various types of splints, plasters and other forms of apparatus. As I have mentioned before the carrying out of rest treatment is difficult because as soon as patients improve they want to get going right away. In adults the economic situation enters into the picture and in many instances the treatment has to be shortened to allow the man to go to his work or the housewife to go back to run her household. In hospitals we carry out this treatment fairly well but when we mark the patient out it is so difficult, in many cases, to explain exactly what we mean. We must give our orders in language that the patient or parents can understand and issue accurate instructions so that the rest can be measured. One way of accomplishing this is to give them a definite time each day that they can be up or giving them a definite distance that they may walk. In letting our patients up who have been in bed any length of time we always supply them with crooked heels. When the time comes for active treatment and the patients are given more freedom of action all concerned must be cautioned against the dangers of fatiguing these weakened muscles. Normal muscles, when overworked, tire and lose power, and the same thing is true in muscles which have been affected by polio. The great difference is that it appears much earlier and if not recognized permanent damage might ensue. The appearance of fatigue is shown by regression in the power in the affected muscle as evidenced by a lessening of the range of movement of the part. In the early stage of physiotherapy it may appear after a very few contractions, while, when the patient is out on his own, it may not appear for some hours. The general routine has been to instruct the physiotherapy department about the clinical signs of fatigue and to impress upon the patients and parents the necessity of not getting tired and, when they do, the treatment is rest.

We rely upon physiotherapy to increase the power in the affected muscles. This is done by muscle re-education, which can only be efficiently carried out by a well trained physiotherapist. These people must have an excellent knowledge of working anatomy so that they will be sure of training the right muscle. The patients are so keen to get better that they will often move the part by a trick movement and the result will be to build up the already strong muscle. It takes a well trained individual to recognize such a situation and correct it. The main trouble with good physiotherapists is that they are so very scarce.

Apparatus such as splints, braces, belts, corrections to shoes are worn to support the part after muscle training by the physiotherapist and to allow the patient to become ambulatory. The ambulatory type of treatment is having quite a lot of competition from the modern paraplegic chairs which are very popular with the patients. They are new, they are easily handled and the patient can get about quickly and easily. However, I think one should stick to the original idea and get the patient up and about on his feet and moving under his own steam. The supports must be efficient, light and well fitting so that they are comfortable to wear. These articles are much more easily obtained in the manufacturing centres of the east than in the agricultural west where well trained artisans are hard to find.

When we have come to the conclusion that there is going to be no further increase in the muscle power and that the picture is stationary, we have reached the stage where reconstructive surgery may be undertaken. This is known as the chronic stage and is usually considered to have been reached two years after the onset. Previous to this the only surgery undertaken has been to remove deformity which interferes with treatment. No matter how good preliminary treatment has been or how efficient our supervision there are always going to be a certain number of cases that will be benefited by constructive surgery. These surgical procedures may be grouped into those in which the tendons, fascia and ligaments are used, and those in which the work is mainly carried out on the bony structures. In children the operations, as a rule, fall into the first class because we wish to disturb the growing bone as little as possible. The operations in this class are usually tendon transplants and the fasciotomies. As the patients become teenagers and adults we find the operations on the bony structures are the more usual procedures. None of these reconstructive operations should be undertaken without having the case carefully worked out and without having a clear conception of the actual technique of the surgical procedure contemplated. For example in the subastragaloid arthrodesis one of the most important things to remember is that besides doing the bone work one must dislocate the foot backwards. At the same time that these bone operations are done we should not forget that the pull of a tendon, even so very slight, can ruin a well performed bone job. If the pull of the tendon is likely to cause recurrence of deformity the tendon must be transplanted.

In this series of 1,032 cases, 325 operations were performed. As some of these patients were operated upon several times it must be seen that the majority of the cases made a good recovery or only had a minimal amount of disability. Using the classification given in the last paragraph 109 of these operations were in the tendon and fascial class and 216 in the bone class. Many of the 216 operations might be described as primary operations but a great many had to be done on account of failure of the tendon or fascial procedures which were carried out when the patients were younger.

The experience obtained seems to show that the after care of poliomyelitis can be safely carried out under the fundamentals laid down by Jones and Lovett. They are not very many nor are they hard to remember. In the first stage the treatment is set out under three headings: rest, prevention of deformity, and the avoidance of meddlesome therapeutics. In the second or convalescent stage attention is given to physiotherapy, and surgery is only used to remove a deformity which interferes with the treatment. The third or chronic stage is the only one in which reconstructive surgery should be attempted.

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RÉSUMÉ

L'auteur donne une brève définition de la poliomyélite et la variété des symptômes par lesquels cette maladie se manifeste. Il semble évident que la prédominance d'un symptôme en particulier varie avec les différentes épidémies. Le traitement est divisé en plusiers parties.

Au début: 1°. Le repos pour soulager la douleur, avec comme adjuvant les enveloppements humides préconisés par Sister Kenny. 2°. La prévention des difformités; l'auteur indique les différents moyens et la conduite à tenir dans leur application.

Dans la période de convalescence: 1°. La physiothérapie sous la direction de physiothérapistes entrainés. Par cette méthode les muscles atteints sont rééduqués. 2°. Le traitement chirurgical lorsque le progrès est devenu stationnaire et la maladie rendue chronique i.e. deux ans après son début. Ce traitement comprend la chirurgie des tendons, ligaments, aponévroses et la chirurgie osseuse. La première est employée surtout chez les enfants dans la période de croissance.

YVES PRÉVOST

THE SUPERFICIAL ULNAR ARTERY WITH REFERENCE TO ACCIDENTAL INTRA-ARTERIAL INJECTION

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THE discovery of a superficial ulnar artery during surface anatomy classes at the University of Toronto and the availability of specimens for further investigation have served to inspire this article. Certain anatomical variations of the brachial artery and its branches at the elbow have been recorded for many years. However it is only recently, with the frequent use of intravenous injections, that this significance has been disastrously demonstrated.

Normal arteries of the elbow and forearm.—The brachial artery begins at the lateral limit of the axilla and ends less than an inch below the bend of the elbow by dividing into the radial and ulnar arteries. In the

arm the artery at first lies medial to the humerus and then it gradually moves laterally on the brachialis until at the elbow it lies midway between the two epicondyles of the humerus. It is subfascial throughout its course, being covered by skin, superficial fascia and deep fascia. At the elbow it sinks deeply into the cubital fossa and is there covered by the bicipital aponeurosis of the biceps tendon.

The larger ulnar and the smaller radial artery arise in this fossa and pass obliquely down the ulnar and radial sides of the forearm to the wrist and beyond. As the ulnar artery courses deep to the superficial flexors of the forearm and flexor digitorium sublimis, it gives off a large common interosseous branch and two recurrent branches. The radial artery is crossed by no muscle in the forearm, but it is overlapped by the brachioradialis in its upper two-thirds.

Anomalous superficial arteries in the forearm. —The blood vessels of the body are noted for their frequent variations from their normal courses. These variations can best be appreciated when the method of development of blood vessels is recalled. The arteries of the body are not laid down as the individual tubular structures known to us from the study of adult anatomy. A more alterable process takes place with remarkable variations possible. Thus, the developing limb buds of the embryo are provided with networks of capillaries which advance and expand into the growing limb, until about the sixth fetal week, certain channels through this maze of vessels are selected to become the main artery. The remainder of the network becomes side branches or completely disappears. Although the channel selected is surprisingly consistent, persistence of other parts of the network as the main vessel results in variations of the course and distribution of the artery.

The brachial artery may suffer from this process of variation. For example, with considerable frequency the brachial artery divides at a higher level than usual. In this case the radial artery most commonly arises high up as a single branch, leaving the ulnar artery to follow its usual course and distribution. Less commonly the ulnar artery arises high up as a single branch, leaving the radial artery to give rise to the common interosseous artery and follow its usual course. In either case a superficial artery may result in the forearm. Such an artery courses down the forearm superficial to muscles and subjacent to deep fascia which is here quite thin. Occasionally, however, it may course superficial to the deep fascia for a variable distance on the forearm.

In 1844, Richard Quain, the professor of anatomy at University College, London, published his observations on the arteries of 1,040 bodies. This culmination of long labour is today our classical reference to the arteries and their variations. From his tabulated observations I have culled statistical data on superficial arteries. He found high division of the brachial artery, usually near its origin, in 12% of 418 limbs. The radial artery had a high origin in 11% of 429 limbs and the ulnar artery in 7.3% of 422 limbs. In almost every instance in which the ulnar artery arose high, its course was superficial; that is to say, an ulnar artery with high origin will almost always be a superficial ulnar artery. Additional statistics on the superficial ulnar artery, gathered from Quain's observations, are given in Table I.

TABLE I.

(AFTER QUAIN 1844)

Detail	*Right arm*	*Left arm*	*Total*
No. of limbs examined.....	225	197	422
High origin of ulnar artery.	19	12	31
Superficial ulnar artery....	18	11	29
(*a*) Unilateral.....			13
(*b*) Bilateral.....			8
(*c*) Deep to deep fascia throughout.....	14	10	24
(*d*) Deep to deep fascia and palmaris longus only.....	1	1	2
(*e*) Superficial to deep fascia.....	2	0	2
(*f*) Superficial to deep fascia and then deep	1	0	1

Incidence of superficial ulnar artery 6.8% of 422 limbs.

Adachi, in his work on Japanese cadavers in 1928 at Kyoto and Okayama, found 0.7% superficial ulnar arteries in 1,198 limbs. He also summarizes the work of European observers which showed an incidence of 2.5% of 488 limbs. This difference causes Adachi to observe, rightly or wrongly, that the Japanese are further advanced along the evolutionary scale than members of the Caucasian race.

ORIGINAL RESULTS

(*a*) *In cadavers.* — In the Department of Anatomy of the University of Toronto, 6 superficial ulnar arteries were found in 188 dissected limbs that were examined, an incidence of 3.1% of limbs. All but one of these six superficial arteries had a high origin; the sixth originating below the level of the medial epicondyle and then rapidly becoming superficial. In two cases the artery coursed between skin and deep fascia for a variable distance below the elbow, then pierced the fascia, and ran deep to it. The

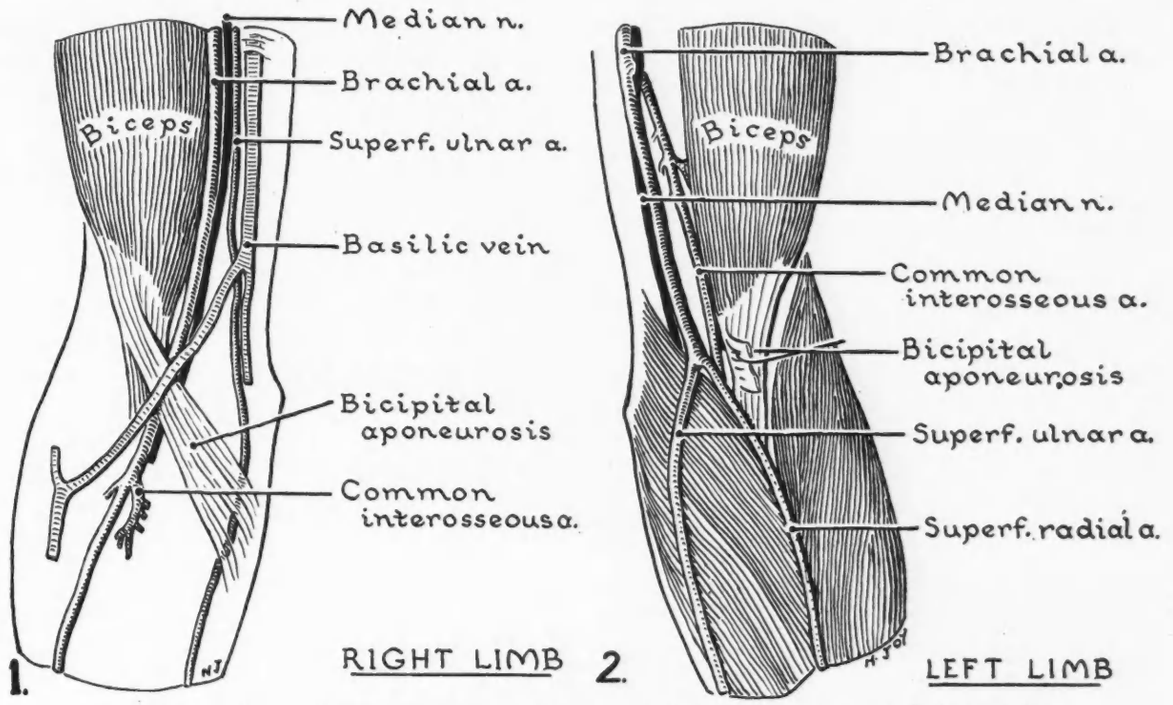

Fig. 1.—A superficial ulnar artery, which arose high in the arm, is coursing through the bicipital aponeurosis superficial to the muscles of the forearm (not shown) and is closely accompanied by a tributary of the basilic vein. **Fig. 2.**—A superficial ulnar artery and a superficial radial artery are arising from the brachial artery by a common stem and passing deep to the bicipital aponeurosis (reflected) but superficial to the muscles of the forearm.

remaining four arteries were subjacent to deep fascia throughout the forearm. Of these four arteries, one was in addition deep to palmaris longus. In all six cases the interosseous artery and consequently the main blood supply of the forearm was derived from the radial division of the brachial artery (see Figs. 1 and 2). The superficial ulnar artery was however, always of good size and contributed to the superficial palmar arch in the palm of the hand. Further observations are tabulated in Table II.

TABLE II.

CADAVERS

ANATOMY DEPARTMENT, UNIVERSITY OF TORONTO, 1945-1948

Detail	*Right arm*	*Left arm*	*Total*
No. of limbs examined	94	94	188
(*a*) Male			184
(*b*) Female			4
High origin ulnar artery			
(*a*) Axilla	1	2	3
(*b*) Midarm	2	0	2
(*c*) 1½″ below med. epicondyle	1	0	1
Superficial ulnar artery	4	2	6
(*a*) Unilateral			4
(*b*) Bilateral			1
(*c*) Deep to deep fascia throughout forearm	2	1	3
(*d*) Deep to deep fascia and palmaris longus.	0	1	1
(*e*) Superficial to deep fascia	0	0	0
(*f*) Superficial to deep fascia and then deep	2	0	2

Incidence of superficial ulnar artery 3.1% of 188 limbs or 5.3% of 94 cadavers.

(*b*) *In medical and dental students.*—In order that the incidence of the abnormality under discussion might be related in cadaver and living subject a survey was made of superficial ulnar arteries discernable by inspection and palpation of the forearm. For this purpose a group of 271 medical and dental students were

TABLE III.

LIVING SUBJECTS

MEDICAL AND DENTAL STUDENTS

UNIVERSITY OF TORONTO, 1949

Detail	*Right arm*	*Left arm*	*Total*
No. of limbs examined	271	271	542
(*a*) Male			514
(*b*) Female			28
Superficial ulnar artery	7	8	15
(*a*) Unilateral			9
(*b*) Bilateral			3
(*c*) Distance palpable on forearm			
1. One to two inches.	2	3	5
2. Two and half to three inches	3	3	6
3. Three and half to five inches	2	2	4

Incidence of superficial ulnar artery 2.7% of 542 limbs or 4.4% of 271 living subjects.

examined. The examination consisted of inspecting and palpating the medial side of the arm and forearm as though an intravenous injection were contemplated. That is to say, the subject's limb was examined in a good light with the forearm supported and relaxed and the elbow flexed.

A superficial ulnar artery was discovered in 15 instances, an incidence of 2.7% of the 542 limbs examined and almost identical with the results found in the cadavers. There were three bilateral and nine unilateral cases. Fourteen women were included in this group and a superficial artery was not found among them.

The anomalous artery was usually quite easily discovered outlined on the skin surface just below the medial half of the skin crease in front

Fig. 3.—The arrow points to a superficial ulnar artery closely accompanied medially by a superficial vein. This artery is easily seen and palpated for five inches in the forearm.

of the elbow. It is noteworthy that a well marked superficial vein always accompanied the artery closely on one side or other as a companion vein (Fig. 3). The artery lacked the bluish colour of the superficial veins. Pulsation was discernible on inspection in only four cases, but on palpation it was always felt with little difficulty. A tourniquet applied to the arm obliterated pulsation in the superficial vessel.

In addition to these observations, it was noted that the brachial artery was quite superficial and easily palpated at the bend of the elbow joint, just medial to the biceps tendon, in a considerable number of cases. All the arteries noted as superficial ulnar arteries, in addition to these easily palpable brachial arteries, must be considered in danger if an intravenous injection was contemplated.

ACCIDENTAL INTRA-ARTERIAL INJECTION

Gangrene of the fingers or of the forearm and muscle contracture have followed injection of arteries with iodides for pyelograms or arteriograms, ethanolamine for varicose veins, quinine for malaria, arsphenamine or bismuth for syphilis and sodium pentothal for induction anæsthesia. Lundy states that even death may occur following an intra-arterial injection of pentothal because the drug does not suddenly mix with a large volume of blood in the heart and reach the brain; hence warning signs do not occur as in intravenous injection. Anæsthesia which usually follows intravenous injection in 5 to 10 seconds will not occur for 45 to 50 seconds when given intra-arterially, consequently an overdose of pentothal may be given.

Reported cases are rare, naturally, and are usually due to the use of sodium pentothal in a 5 or 10% solution. Cohen of Gravesend, England, recently reported 12 cases. In these, the injection was made into a superficial ulnar artery in at least 5 cases and into the brachial artery in 5 cases. Eight of the patients eventually had amputation of either the forearm or fingers; whereas four had their limbs recover, one with contraction and one with atrophy of the forearm.

The essential pathology of intra-arterial damage includes early or late thrombosis of the artery coupled with distal arteriolar spasm. Since the anæsthetic or other agent is only momentarily held in the artery, the resultant damage must be due to immediate and severe irritation; in the case of pentothal it is possibly due to the high pH of the solution. The symptoms of injection are first a burning, fire-like pain in the hand followed by blanching of the hand, cyanotic fingers and bluish mottling of the forearm occasionally accompanied by œdema. Delayed loss of consciousness up to one minute may be the only sign immediately after injection.

Treatment, once the condition is recognized, should include immediate or postoperative heparinization, possibly with an injection into the affected artery. If the operation in progress must proceed, cyclopropane anæsthesia, due to its effect on the clotting mechanism, is

best advised. Sympathetic ganglion or brachial plexus novocaine block is valuable as in other cases of arterial thrombosis. Surgical intervention for the arterial thrombosis should take place, if at all, within a few hours after the accident and consist of arteriotomy with clot extraction. Subsequent therapy should consist of keeping the affected limb wrapped up at room temperature, immersing the opposite upper limb in hot water, covering the body with a heat cradle and the use of vasodilators such as tetraethyl ammonium chloride or papaverine hydrochloride.

Preventive measures of value include knowledge of the arterial abnormalities at the front of the elbow, careful palpation of the forearm with and without a tourniquet in a good light, awareness of the possibility of such an accident and immediate diagnosis followed by proper treatment. If these measures are practised by those concerned in the increasing use of intravenous drugs, the occurrence of intra-arterial injection and its sequelæ will decrease.

SUMMARY

1. The anatomy of the arteries at the front of the elbow is given and possible abnormalities are noted.

2. Observations regarding the superficial ulnar artery were made on 94 cadavers and 271 university students. It was found to arise high in the arm, to supply only a few twigs to the muscles of the forearm and to terminate with normal ulnar distribution in the hand. It was easily found for a distance of one to five inches on the forearm of the living subject, always closely accompanied by a superficial vein. It was bilateral in 4 of 17 individuals and occurred in 2.9% of 730 limbs.

3. The problem of accidental intra-arterial injection is reviewed. Pathology, symptoms and treatment are presented.

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THE TREATMENT OF ESSENTIAL HYPERTENSION*

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BECAUSE of the conflicting reports, particularly of more recent methods in the therapy of high blood pressure, this very important subject is at present in a state of confusion in the mind of the average practitioner. In the light of our present knowledge, an attempt will be made to outline the proper course of action to be taken when confronted with a case of hypertension, particular emphasis being placed on the therapy of essential hypertension.

DIAGNOSIS

Diagnosis is of primary importance in order to rule out the non-essential types of high blood pressure. For this purpose, hypertension is best divided into the two great groups: (1) systolic and (2) diastolic.

1. *Systolic hypertension.*—First just a word about the systolic hypertensions, where only the systolic pressure is raised and which is the common hypertension seen in the elderly due to an atheromatous aorta (where no special therapy is required). It is also seen in aortic regurgitation, thyrotoxicosis and complete heart block, where one attempts to treat the original condition: or it may be a sign of patent ductus arteriosus as well as arteriovenous aneurysm where therapy consists of surgical closure of the abnormal shunt.

2. *Diastolic hypertension.*—However, we are more concerned with the diastolic hypertensions where the diastolic blood pressure is 100 or more. From the therapeutic point of view it is helpful when first presented with a case of diastolic hypertension to think of three possibilities:[9] (*a*) *Secondary to a known underlying process or disease which cannot as a rule be completely remedied.* Here therapy of course is chiefly that of the underlying condition. Examples of this group are glomerulonephritis, polycystic disease of kidney and Cushing's syndrome. (*b*) *High blood pressure due to more specific and often remediable causes.* This is the group that responds best to treatment of the

* From an address given at the February, 1948 meeting of the Maimonides Medical Society, Buffalo, N.Y., and also at the April, 1948 meeting of the Mount Sinai Clinical Society, Toronto, Canada.

abnormal condition and includes such things as enlarged prostate or any other cause of interference with urinary outflow associated with renal damage, kinking of renal vessel, pheochromocytoma, coarctation of the aorta and unilateral pyelonephritis. The incidence of this group, which is made up largely of pyelonephritis, ought to diminish in future, because of the potent urinary antiseptics now available.

The younger patients in whom the elevation of pressure does not date back more than a few years, and who have good renal function and a healthy contralateral kidney, stand the best chance of benefit by nephrectomy. However, a review of the literature shows that only about one-third of the cases operated upon even for definite advanced unilateral renal disease show a good result after five years,[2, 22] and there is no way preoperatively of predicting the effect of nephrectomy. Nevertheless all hypertensive patients under 45 years of age should have an intravenous pyelogram performed to exclude unilateral kidney disease, and followed by retrograde pyelography if some abnormality is found, particularly if there is a history suggestive of kidney trouble.[20]

(*c*) The third group of diastolic hypertensions and the one which we are most concerned with since it is the largest, consisting of over 70% of all cases, is primary or essential hypertension. In order to be certain that the patient belongs to this group, it is wise to perform adequate tests to rule out known etiological factors such as those mentioned above.[5] Ideally, these investigations are best carried out during three to seven days in hospital, but this is not often possible today.

THERAPY OF ESSENTIAL HYPERTENSION

1. *Rest, sedation and psychotherapy.*—If one could hospitalize patients it would be so much easier to start applying our greatest known methods of therapy, namely rest, sedation and psychotherapy (particularly commonsense advice). But these same principles can be followed on the outside. The emotional element, regardless of other as yet unknown etiological factors, is usually extremely important, and by reducing this alone, the hypertensive state, especially when attacked early in its onset, may entirely disappear. The effect of emotion on the body mechanism should be explained to the patient in simple terms and he should be instructed how to alter his daily routine. Demonstrate (particularly to the early labile hypertensive with so-called pressor hyperactivity) the drop in blood pressure with rest and relaxation, and thus ensure his co-operation in order to shorten or eliminate periods of heightened pressure.[29] Secondly, assure him of the favourable outlook, that the actual span of life (especially in women) may not in the end be much less than normal.[4, 28] Retirement from work is often bad, and leaves the patient with nothing to do but fret and worry over himself; but hours should be curtailed and responsibility shed as much as possible. Moderation in all things is the important rule always. The night's rest should be an hour or two longer than average and reading in bed encouraged so as to promote this habit. The weekend should be restful. The more severe cases are helped tremendously by one day per week spent in bed.

In order to assist this effort to change or modify his personality, so to speak, (as well as to make it easier for him to stop smoking, which is usually indicated because of the definite vasospastic effect of nicotine), the simple drug phenobarbitone gr. ¼ to ½ three or four times daily, is an invaluable aid because of its sedative action, and should be given at this time. However one must be very wary about accepting claims of improvement by any one group of workers following one type of drug or another, as their results can usually be duplicated by a placebo and are probably due to the decrease in emotional tension associated with the absolute trust in the doctor and his pill. In the same light one cannot expect good results if the patient has no confidence in the doctor. Incidentally one should overlook the apparent good results with thiocyanate again reported by several workers in recent months, since the margin between adequate dosage and dangerous excess, is too narrow to advise its use.[23, 27]

2. *Reduction of weight: calorie restriction.*—Obesity is usually an associated etiological factor only, but so often the blood pressure drops significantly and even becomes normal and remains so if weight is kept within normal limits. Hence it is inexcusable to perform more extensive methods of therapy such as sympathectomy before noting the response to simple reduction in weight alone (together with rest, sedation and psychotherapy as referred to above).

3. *Sodium restriction therapy.*—It is possible, however, that until a more specific cure is available, many of the more severe problem cases may be helped by this more recent therapy. To date there are really two different types of diet, both of which probably depend on great sodium restriction for the surprising but definite improvement so often resulting even in cases with advanced hypertension.

(*a*) *Rice diet.*—The first of these is the rice diet of Walter Kempner[14, 15] who uses drastic reduction of fluid (1,000 c.c.), protein (20 gm.), fat (5 gm.), as well as sodium (150 mgm.). By strict adherence to rice, fruit, fruit juices and sugar, supplemented by iron and vitamins, 167 hypertensives, some essential and some non-essential in type, many who had previously been tried on other forms of therapy including extensive sympathectomy, showed a drop in blood pressure. Kempner claims blood pressure reduction in 64% after use of the diet for two months or more, while a still greater percentage is claimed to show symptomatic improvement.

Kempner asserts that this diet does not cause a depletion of the hæmoglobin or plasma proteins in the blood because of a decrease in nitrogen excretion, as well as the protein-sparing effect of carbohydrates. Kempner's explanation of his excellent results is rather vague. He claims that the benefit is obtained by decreasing harmful metabolites ordinarily produced in a mixed diet, and thus compensating for renal metabolic dysfunction. However, this hypothesis is inadequate in view of the response of non-renal (*i.e.*, essential) as well as renal types of hypertension. His excellent results, however, have been duplicated by other workers,[3] although the strictness of the diet makes it a great hardship and difficult to follow.

(*b*) *Low sodium diet.*—For the above reasons the low sodium diet is favoured as practised by Bryant of Ann Arbor. A short time ago I had the opportunity of observing these patients with him and personally interviewing them at some length. There is no doubt that this diet produced definite improvement in many cases, most of whom had been adequately but unsuccessfully tried on all other known therapy. The results obtained were as beneficial as those observed by Kempner on a diet less inconvenient, more palatable, but containing the same great restriction of sodium. This suggests that Kempner's results may be primarily due to sodium restriction. Other authorities agree with this concept which was substantiated experimentally by Grollman and Harrison.[12] Using rats with experimental hypertension, they confirmed Kempner's finding that the rice diet leads to marked blood pressure reduction. However, the mere addition of sodium chloride (but not potassium chloride) prevented the drop in blood pressure, thus proving that the hypotensive effect was due to the restriction of sodium rather than the strict diet *per se.* In their report at the third Inter-American Cardiological Congress in Chicago in June, 1948, Beronsky and Cohan of Buenos Aires, Argentina, agreed with this concept, although their results were not as favourable as those hitherto reported.

Grollman's[11] good results in five out of six patients is duplicated by Bryant's[6] much larger series. One hundred patients with essential hypertension had been placed for periods of several weeks to twelve months on an average diet except for the very low sodium. For the first few weeks a daily fluid intake of three litres was maintained both to help eliminate the excess sodium as well as to prove that Kempner's marked fluid restriction was unwarranted. All were out-patients with advanced hypertension and definite secondary changes in most cases; a number had failed to respond to a previous sympathectomy. The majority of all cases showed moderate improvement or were completely relieved of their discomfort. In most of those with angina pectoris, the frequency and severity of the seizures were diminished. There was a definite and progressive decrease in the size of the heart in some cases where it had been enlarged. The inverted T waves frequently seen in hypertensive heart disease had in some cases become upright, and papillœdema diminished. As with Kempner's diet and sympathectomy, the relief of symptoms and the above described objective changes were not uniformly associated with a significant fall in blood pressure. It was noteworthy that the older patients with long-standing hypertension had experienced even a more striking drop in blood pressure than younger individuals.

In my own limited series, the results have likewise been satisfactory, tending to confirm Bryant's work. I have taken great pains to

first treat hypertensives by the other conservative measures referred to above, to which most responded and (except for the last case cited) put them on the low sodium diet only when and if the result was otherwise inadequate. Thus was established a perfect control experiment which to date consists of five cases, all of whom showed definite improvement both subjectively and objectively. These are described in detail at the end of the paper.

The diet must be carefully prepared with the help of a dietician and trained food analyst, and contain no more than 200 mgm. of sodium per day. Most low salt diets in use at the present time total one to two grams sodium per day, and this is possibly responsible for a large number of failures. Attention to detail is absolutely necessary. Since many medicines contain sodium, it is wise to prohibit all self-medication. The proposed diet (see appendix) which is very similar to that used so successfully by Bryant at the University of Michigan, contains approximately 1,300 cal. without the added sugar and unsalted butter. The latter two foods, since they contain no sodium, may be taken as desired and to obtain the required calories for the day's diet.

Milk is not permitted, as one glass contains 100 mgm. sodium. At present there is no adequate milk substitute in Canada, but it has been promised by the Mead Johnson and Co. that lonalac, which contains all the elements of milk without the high sodium, will soon be made available. For the Jewish patient who follows the dietary laws, broiled meat should be advised, as Koshering with salt is unnecessary when prepared in this way. Bread contains 100 mgm. of sodium per slice, and must therefore be prepared salt-free or else omitted entirely. Some bread companies make such a bread at present, although its salt-free content is not as reliable as when made by the housewife herself. In the hospital it is an easy matter to cook unsalted rolls in place of bread. Matzos may be used as a bread substitute.

Canned vegetables may be used only if prepared without salt; however, frozen vegetables when obtainable are more than an adequate substitute.

To illustrate the great importance of detail, one need only mention several cases that failed to respond because the salt in the drinking water in that particular locality was excessively high. Incidentally, the amount of sodium in Toronto drinking water is extremely small, so patients in this city do not have to drink distilled water. Vitamins should be given to make sure no deficiency develops.

The only trustworthy non-sodium containing salt-substitute is neocurtasol (Winthrop), although most people do not like it due to its metallic flavour.

Finally a word of warning. One must not forget the obvious dangers such as predisposing to uræmia in cases with marked kidney damage, and one would hesitate to use the diet in such cases. At present we have no method other than the therapeutic trial to determine which subjects will respond to drastic sodium restriction, but so striking are the blood pressure reductions and relief of symptoms in some patients, one feels it is certainly worthy of adequate trial where more conservative therapy fails.

4. *Sympathectomy.* — Although it is actually too early to arrive at a definite conclusion, we must at this time decide what is the best type of case in which to perform a sympathectomy, what is the best type of procedure, and what results to expect. Originally when it was thought that this operation benefited simply by preventing arteriolar constriction, tests of blood pressure lability were introduced such as the pentothal test, exposure to cold, amytal test, etc., but now we know that although a satisfactory response may be an additional factor in favour of sympathectomy, it is perhaps the least important.[8, 10]

Various authorities differ in their criteria for operation, and I will at this point state the conclusions of the International Conference of Physicians, Cardiology Section, held September, 1947, in London, England. After considerable discussion it was agreed that the most opportune time for operation is in a patient under 50 years of age, (preferably under 45), who has been followed regularly and whose hypertension and symptoms and signs are persisting and *progressing* in spite of adequate conservative therapy. Because the proper conservative therapy may bring improvement, and because generally speaking less than one-half of the cases operated upon, regardless of preoperative tests, show no definite and lasting response, one should not recommend surgery until the time when the heart is beginning to enlarge

or/and the kidneys begin to show definite decrease in function, or/and the eye-grounds begin to show definite retinitis, or/and (this is of less importance) the electrocardiogram begins to show definite evidence of left ventricular hypertrophy.

De Takats and Fowler of Chicago, Illinois, reported at the American Heart Association meeting in Chicago in June, 1948, that the ability to concentrate satisfactorily as evidenced by return of original normal specific gravity four hours after the ingestion of water, is proportionate to the postoperative results following sympathectomy. These results have not yet been substantiated.

A review of the literature[1, 7, 10, 13, 17, 21, 24] leads one to agree with Grimson and his associates that it is the *extent* of sympathectomy that is important rather than the type; so for the time being one feels that any operation less extensive than the Smithwick procedures is not to be preferred. Smithwick combines the supradiaphragmatic approach of Peet and the subdiaphragmatic operation of Adson, and he has demonstrated that extensive removal of the sympathetic nervous system was necessary to maintain a prolonged lowering of blood pressure in order to guard against future regeneration of interrupted pathways.[25, 26]

Learmonth,[16] Professor of Surgery at Edinburgh University, agrees with most long term follow-up studies when he reports not more than 25% of patients showing permanent, substantial fall of blood pressure after extensive sympathectomy, although a greater percentage received symptomatic relief even in the absence of any fall in blood pressure. The earlier the stage of disease and the better the visceral function, the better the results. However, he also feels there is not sufficient justification to operate for example on cases of intermittent hypertension so often seen in a young person. Even Peet,[18, 19] who reports more favourable results over a twelve year period, agrees that progression of the hypertension must be present before one should operate.[25, 26]

When the patient already has definite secondary changes as referred to above and is under 50 years of age, and has had an adequate trial on conservative therapy, all we can say regarding operation is that one must individualize, depending on the amount of symptoms present, and the rate and extent of secondary damage as well as the exact age of the patient. Many are the cases that are left postoperatively with a very persistent and severe backache, marked postural hypotension, and in the male, sterility (but not impotence). The presence of congestive heart failure or gross impairment of renal function absolutely excludes surgical measures, and it is unwise to operate on patients with papillœdema (*i.e.*, malignant hypertension) as well as those with angina pectoris, although so-called encephalopathies do not contraindicate operation provided no residual symptoms and signs are present.

REVIEW OF CASES TREATED BY AUTHOR ON LOW SODIUM DIET

CASE 1

Mr. K.G., 40-year old male musician, had been suffering from hypertension since 1940, at which time he was turned down by the Air Force. Since 1944 he had been having typical anginal attacks—exertional pain in præcordium radiating down both arms and relieved by rest or nitroglycerine—which were increasing in severity and frequency until, when first seen on October 6, 1948, he could not walk more than 25 yards. He was having about 15 to 30 attacks per day and symptoms were increasing (in spite of massive doses of vitamin E for the past year).

Examination (positive findings) revealed a 5 ft. 7 in. male weighing 163½ pounds, blood pressure 170/120, and ophthalmoscopic examination showed sclerosis plus 2 (tortuosity of vessels and A - V nicking but no hæmorrhages, œdema or exudate). Heart sounds were of good quality, but rough grade 2 systolic murmur was heard as well as early faint aortic diastolic murmur. A^2 was very loud as compared to P^2. Femoral vessels were readily palpable.

Fluoroscopic examination and chest x-rays showed heart chambers within normal limits, although marked dilatation of ascending aorta was present. The electrocardiogram showed no axis deviation but some slurring and diphasic T waves in all standard leads, while other studies revealed fasting urine specific gravity 1.020 with negative albumen and sugar, Hb. 85%, non-protein nitrogen 34 mgm. % and blood Wassermann negative. Intravenous pyelogram negative. The cardiac diagnosis was (*a*) hypertension (essential) and arteriosclerosis; (*b*) dilatation of aorta; moderate coronary disease; (*c*) normal sinus rhythm; angina pectoris—marked; early aortic insufficiency; (*d*) class 3 d.

For therapy, sedation and greater rest proved of little benefit, his blood pressure three weeks later being 164/120. Low sodium diet on that date however, produced a remarkable improvement within three days, and when next seen on November 9, 1948, instead of 30 to 40 nitroglycerine pills per day, he was taking five per week. Whereas before starting diet he would require at least two nitroglycerine pills on walking from where he parked his car to his home (530 steps), he now did this distance easily without taking any pills. (He had lost about five pounds in weight since first seen, when put on reduction diet). His blood pressure had dropped to 140/100.

When last seen on December 16, 1948, he was still improving, requiring only two nitroglycerine pills during previous week, although his blood pressure had not changed since previous examination. However, an electrocardiogram showed erect T waves in leads 1 and 2 as compared to diphasic T waves in these leads before therapy.

CASE 2

Mr. S.B., male, aged 65 years, had been semi-invalid because of dyspnœa and palpitation for two years following coronary thrombosis attack. I first saw him on April 26, 1948, at which time he was bed-ridden following an attack of the "flu", and was very short of breath after going a few steps to the bathroom.

Examination revealed blood pressure 190/115 with no signs of heart failure. Ophthalmoscopic examination revealed sclerosis plus 2. Electrocardiogram showed left bundle branch block, old anterior coronary occlusion and prolonged A - V conduction time. He was given sedation and the digitalis that he had been on for three years was continued (although vitamin E was stopped). He gradually improved enough to get out of bed and on June 11, 1948, when first seen at my office, he still had great difficulty in walking due to shortness of breath. His blood pressure at that time was 210/130 and fluoroscopic and x-rays revealed slightly enlarged left ventricle. His non-protein nitrogen was 42 mgm. %. He was at this time first put on the low sodium diet, and on July 2, 1948, when next seen, he felt better than ever before during the previous two years. He was driving his car and was going to his office daily (although against advice) with minimal symptoms. His blood pressure was 180/100.

On September 24, he still continued to feel fine and his blood pressure had dropped to 180/90. On November 28, he had a transurethral prostatectomy with no untoward symptoms. There was no change in electrocardiogram, ophthalmoscopic examination or appearance of heart after this successful therapy with the low sodium diet.

CASE 3

Mrs. D., 72-year old female, gave a history of increasing blood pressure during past 15 years. When first seen at her home on September 27, 1948, she was bedridden and complaining of dizziness, weakness and dyspnœa on slightest exertion. Ophthalmoscopic examination showed sclerosis plus 2, while rest of examination was not remarkable except for blood pressure 280/130. The electrocardiogram showed only slight evidence of left ventricular hypertrophy (left axis deviation and slight diminution in height of T_1 and T_2).

The usual conservative therapy produced very little change in symptoms, and she was still bed-ridden, although blood pressure dropped to 230/100 on November 8. At this time she was put on low sodium diet, after which she claimed very definite improvement in all symptoms and was able to visit my office for first time on December 20, at which time her blood pressure was 190/100. An electrocardiogram taken at this time showed slight increase in the height of the T waves in leads 1 and 2. A fluoroscopic examination revealed slight enlargement of left ventricle and dilatation of aorta. Ophthalmoscopic examination still showed same findings as at onset of therapy.

CASE 4

Mr. A.S., 60-year old male with a history of high blood pressure dating back six years, with increasing attacks of angina pectoris, palpitation, dyspnœa and dizziness. Three months prior to time when first seen, he had suffered an attack of acute pulmonary œdema and had been bed-ridden ever since (chiefly because of marked dyspnœa whenever he got out of bed). He had been on the "rice diet" with no relief. When first seen on August 25, 1948, he had been given one month to live by a very competent clinician; his blood pressure was 300/130, and ophthalmoscopic examination revealed papillœdema in both eyes, while the left also showed old exudate size of 10 cent piece and one very tiny old hæmorrhage. He showed no evidence of failure, his heart sounds were of fair quality, regular at 60 per minute, and there was a loud aortic and mitral systolic murmur. Electrocardiogram showed typical left ventricular hypertrophy picture (marked left axis deviation, QRS interval 0.1 sec., and depressed RS-T and inverted T wave in leads 1 and CF_4). Urinalysis showed 3 plus albumen. He had been on adequate conservative therapy, but at this time he was also put on the low sodium diet. He claims he didn't mind it at all (compared to his great distaste for the rice diet), and obtained tremendous benefit within three weeks. All dizziness disappeared, and he was able to get about without angina pectoris or other symptoms. When seen again on October 28, his blood pressure was 250/130 and ophthalmoscopic examination, while still showing papillœdema and some exudate, was of less degree, while the retinal hæmorrhage in left eye had entirely disappeared. His blood pressure dropped slightly and when last seen on December 24, it was 220/116. His urine was negative for albumen.

CASE 5

Mrs. E.P., a 36-year old housewife, was first seen on June 6, 1948, with apparently recent high blood pressure of 300/130. She had been at rest and on sedation for several weeks without change in blood pressure or any improvement in symptoms. Examination was not remarkable except for marked obesity (weight 175 lb., height 5 ft. 6 in.). Ophthalmoscopic examination showed no evidence of sclerosis. Intravenous and retrograde pyelogram as well as x-ray of skull was negative. Electrocardiogram and x-ray of heart was within normal limits. She was put on combination of low sodium and reduction diet and lost 25 pounds during the following six weeks. Her symptoms gradually improved, as did her blood pressure, which dropped to 145/110.

This patient should preferably have been treated by weight reduction before instituting the low sodium diet, so that one could differentiate the true value of each therapy in this particular case.

SUMMARY

Thus in the light of our present knowledge, a case of essential hypertension should be handled as follows:

1. Diagnosis is of primary importance. One must first rule out non-essential types of hypertension.

(*a*) Decide whether the case is one of systolic or diastolic high blood pressure or both. Systolic high blood pressure is of less importance and occasionally the specific cause can be treated.

(*b*) For purposes of therapy it is convenient to classify diastolic hypertension into three types: (i) Secondary to a known underlying disease which, although it cannot be completely remedied, should be treated. (ii) Secondary to a specific cause which may be completely remediable. Treatment of unilateral pyelonephritis and hydronephritis is somewhat disappointing, and only the most thorough and complete clinical studies supplemented by refined individual kidney function tests can justify nephrectomy in view of the probability of hypertensive damage to the contralateral kidney. (iii) Essential hypertension, whose exact cause is undetermined.

2. Every case of diastolic hypertension should be thoroughly investigated (if possible hospital-

ized for three to seven days) and the following carried out: (*a*) Decide what group patient belongs to by complete studies and treat underlying condition if such is present. (*b*) Record heart size, retinal changes, electrocardiographic changes, as well as kidney function. (*c*) Response of blood pressure to lability tests to try and estimate the extent of emotional element, although one should not use these results as a sole reason for sympathectomy.

3. If hypertension is essential in type, adequate medical treatment should be given a fair trial. (*a*) Increased rest, sedation (preferably phenobarbitone) and psychotherapy should be started immediately. Smoking is preferably stopped completely. (*b*) If obesity is present, patient should be put on reducing diet until weight is normal. (*c*) In view of the excellent results obtained with salt restriction therapy, it seems logical until we discover a more specific therapy, not only to give this a fair trial before sympathectomy, but to warn all early hypertensives to cut down on their sodium intake. If patient is over fifty years of age, or changes in heart, kidneys, electrocardiogram, or retinæ are more advanced in type (or if malignant hypertension, heart failure or angina pectoris are actually present), and there is no response to conservative treatment, dietary therapy, preferably strict low-sodium regimen should be instituted. Sympathectomy in these types of cases is rarely indicated.

My series of five cases successfully treated with low sodium diet, of whom four had previously failed to respond to other conservative therapy, seems to substantiate the claims of other workers as to value of this method of therapy in otherwise hopeless cases.

(*d*) The patient should be seen repeatedly to both emphasize the importance of "slowing his pace," and also, if under fifty years of age, to note the exact time for operation if progression continues, in spite of conservative therapy as recommended above. Heart size, kidney function, retinal and electrocardiographic changes are important in this respect, and a more extensive operation such as the Smithwick procedure is favoured.

Of course one must individualize when deciding what to advise patient.

LOW SODIUM DIET

Approximately 200 mgm. sodium (500 mgm. NaCl) in 24 hours.

Include exactly the amounts of food listed. *All food is prepared without salt, soda or baking powder.*
Include daily:

Meat or fish. 5 ounces of any *one* of the following: beef, chicken, turkey, lamb, mutton, veal, pork, venison, sweetbreads, fresh unsalted fish (bass, trout, halibut, cod).

Eggs. 1.

Bread (*unsalted*) 3 slices. This may be replaced by unsalted cereal (see below—½ cup equals 1 slice bread).

Potato and cereals. ½ cup of one of the following: potatoes (white, cooked), macaroni (cooked), spaghetti (cooked), rice (cooked), farina (cooked).

Vegetables. ½ cup of any *one* of the following: asparagus, green beans, broccoli, brusssels sprouts, cabbage, cauliflower, cucumbers, eggplant, endive, lettuce, mushrooms, onions, parsnips, peas, tomatoes, carrots (¼ cup only).

Fruits. ½ cup of any *three* of the following: apples, apricots, bananas, cherries, cranberries, plums, grapes, oranges, lemons, peaches, pears, pineapple, rhubarb, strawberries, tangerines, blackberries, gooseberries, mulberries, raspberries, grapefruit, prunes (3 or 4, fresh or stewed).

Sugar. As desired depending on weight of patient.

Butter (unsalted). As desired depending on weight of patient.

Lonalac. 1 pint (if unavailable replace by:

Jelly. 3 tablespoons and

Peanuts (unsalted). 50 to 55 nuts (no skins).

Coffee or tea—clear and weak. In moderate amounts if desired. (Vinegar, pepper, lemon juice, garlic and vanilla may be taken in small amounts if desired).

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AN EXECUTIVE'S VIEW OF INDUSTRIAL MEDICINE*

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THE history of industrial medicine, as you no doubt know, dates back to the early 1800's, but not until the early part of the twentieth century was its true value even partially understood or appreciated. Whatever discouragements its originators may have had, and those who have carried on ever since, no one can dispute the fact that today it plays a very important part in our industrial economy. In my personal opinion it has been, is, and will continue to be, well worth all the time, effort and money that has been spent on its development and promotion.

In 1940 the President of our company had become sufficiently interested in industrial medicine to appoint a medical man to explore its possibilities in relation to our business. As a result, early in 1941, a medical centre was installed at our Toronto plant. The benefits accruing to both employer and employees were so immediately apparent that since that time one has been opened in all our biscuit and candy plants, and our larger bread plants, across the country.

I should like to observe at this point that industrial medicine was never looked upon by the management of our company as just another department of social welfare. It was assessed as a sound economic investment in the general health, efficiency and well-being of all concerned. They readily accepted the fact that public health services had done, and were doing, a remarkable job for communities at large, and came to the conclusion that industrial medicine operating in our plants could perform a very useful and specific function within the activities of our own company.

As each medical centre was equipped and made ready for active operation, the employees of the company involved were called together and management explained to them the reasons why it was being opened and the functions that they were confident it could perform. They were told very definitely that the company did not wish them to visualize it as a philanthropic or social welfare gesture but as a very important company service; that the investment for its provision had been voluntarily supplied by the company, with the firm conviction that if the employees availed themselves of the services that it could render, the investment would be more than justified and a very definite contribution to the health and happiness of all concerned would be achieved. They were publicly introduced to the professional staff in the persons of the physician and nurse in charge.

The addresses, as given by both the executive of the company and the physician, stressed in detail the great desire of the company for the employees to feel perfectly free and comfortable in soliciting, at any time, health guidance at the centre.

In 1946 it became part of company policy that all employees receive a medical examination once a year, and it was a provision of our employment standards that all new employees report to the centre for an examination within thirty days from the date of employment. This matter of regular periodic medical examinations has now been extended to our whole sales organization, which represents over one thousand. Provision has been made by the company's chief medical officer for those employees, who are not situated in a city where the centres operate, to receive the services of a physician in their own locality. As a result of these medical examinations, many cases that would eventually have turned out to be serious illnesses, have been discovered and diagnosed in their infancy, and serious and costly consequences avoided.

I shall now recite a few of the benefits that have resulted from the operation of these medical centres:

1. During the war period, when labour was at a premium, close medical supervision and early diagnosis kept many employees (whom I respectfully refer to as those who otherwise might have been considered "decrepit") healthy and well and on the job.

2. Minor ailment treatments kept otherwise healthy employees in a relieved state of mind and, therefore, efficient operators. Absenteeism, as a whole, was decreased very materially. Many employees, because of the care they received, were able to continue in employment and not lose any material salary which otherwise would have resulted had medical attention not been available. By the same token, the company was able to maintain production which, undoubtedly, had these services not been available would have been lost. Therefore it is evident, on this one point of absenteeism alone,

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that both the employer and the employee received tangible benefits.

3. Healthy operators express greater efficiency. Happy operators, because they are healthy in body and mind, actually produce more per man hour.

4. It has rendered invaluable service to management in "up-grading" or promotion of employees to more important positions where physical health is one of the determining factors of such "up-grading".

5. The changed attitude of labour towards management because of the employee being in a responsive state of mind—due to the benefits he has received personally from the medical services—has been expressed in closer co-operation, greater human understanding for one toward the other and a healthy, happy relationship that is most gratifying to management and employee alike. In simple language I say confidently that by and large the employee of our companies—with the exception of the odd "crank"—looks upon management today first as his friend and secondly as his boss.

In our company we have been particularly fortunate in our choice of professional personnel. This is paramount, in our opinion, in building up a system of successful industrial medicine.

As a layman speaking to professional men, I hazard the statement that the physician and nurse in charge of a medical centre must not only be capable scientifically but must be good psychologists as well. Many of the ills, or supposed ills, diagnosed by the physician can, in my opinion, be best treated by a mixture of "horse sense" psychology and science, and the desired results obtained. In many cases they can never be attained if science alone is resorted to. Medical men and nurses, by virtue of their professional training, are keen students of human nature. They can often discover solutions to problems which management, acting alone, would find difficult. I reiterate, therefore, that the choice of good professional personnel is primarily necessary to the successful operation of industrial medicine. They can and do develop the confidence of the employee in what the whole plan of industrial medicine is designed to accomplish.

The management of our group of companies is completely "sold" on industrial medicine as a sound economic investment. We know that it is impossible to assess all the benefits derived from its application, but it is manifest to us that healthy minds and bodies produce clear thinking, alert physical activity and mental happiness. These three, when brought into play by the individual, produce better workmanship, better quality of product and, on the whole, a healthier social fabric. This, in the opinion of our company, is the goal we should all set our hands to.

In conclusion, I wish to congratulate the medical profession on the excellent job they are doing in industrial medicine. Your generation and the one preceding it has contributed more to humanity in medical discovery than all who have gone before, right back to Hippocrates. When I was a youth I was taught by my parents, and still firmly believe, that yours is a very beneficent calling, wrapped up entirely with the desire of making and keeping your fellow humans healthy and happy. May God and science guide and sustain you in this great humanitarian profession and may you ever content yourselves with the serenity secured by the knowledge of a service truly and sincerely rendered.

IONTOPHORESIS OF PYRIBENZAMINE IN ALLERGIC RHINITIS*

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THE treatment of allergic rhinitis, especially that due to pollen antigen, has been greatly facilitated in the last few years by the oral administration of the new antihistaminic drugs. These drugs have been beneficial in the majority of cases.[1, 2, 3] However, the response to treatment has not been complete in all cases. This is probably due to the relative low level of the drug in the tissues and because of the deleterious side effects which often encumber a high dosage. It has been necessary therefore to attempt to develop a method for temporary relief in those sufferers who have not been able to eliminate the allergen; who have not been able to receive adequate injection therapy; and who have neither obtained benefit from, nor have been able to tolerate the antihistaminic drugs.

Early in the twentieth century, Leduc in France first approached iontophoresis in a scientific manner. In iontophoresis a galvanic current causes ions to migrate through an ionized solution. Ions of drugs in solution placed on the skin or mucous membrane may be introduced into the tissues. The ion that migrates into the tissues is dependent upon the

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polarity of the ion and the direction of the current. Nasal ionization was first used by Baber in 1898. Zinc ionization was used by Franklin in 1932. Warwick in 1934 used a solution containing zinc, tin and cadmium. This produced an aseptic inflammation creating a slight increase in fibrosis. It was attempted by this method to prevent absorption of the antigen and to inhibit the resultant nasal œdema occurring in hay fever. However, the method left much to be desired both in results and in the comfort of the patient.

It has been shown that pyribenzamine hydrochloride can be deposited in the skin by means of iontophoresis and can inhibit histamine whealing for at least twenty-four hours after its introduction.[4] The amount of inhibition is dependent upon the strength of the solution used, the length of time of the application of the electrode and the amperage used. Obstinate cases of pruritic dermatoses which did not respond to oral pyribenzamine, obtained definite relief when treated by the iontophoresis of pyribenzamine hydrochloride directly into the affected area.[5] It was therefore thought that iontophoresis with pyribenzamine hydrochloride might be a probable adjunct in the treatment of allergic rhinitis.

METHOD

An ordinary iontophoresis apparatus was used. Absorbent cotton saturated in an aqueous solution of 5% pyribenzamine hydrochloride was wrapped around the positive nasal electrode and placed in a single nostril so that as much mucosa as possible was contacted. The patient held the negative electrode in his hand. A current of three milliamperes was used for a period of five minutes. After the treatment in this nostril was completed, the other nostril was treated. In this method we have not used the longer period of time of ten minutes or the higher flow of current of ten milliamperes, nor have we cocainized the nose, as was formerly done in the other methods of metallic iontophoresis. We have obtained no pain or discomfort with this therapy other than occasional burning or tingling sensation in the nose. It has been endeavoured to cause as little trauma as possible to the mucous membrane. This was done in order that the evaluation of the therapy would not be obscured by any aseptic inflammation. What is being attempted is the estimation of the benefit obtained from the amount of pyribenzamine deposited in the tissues by the procedure employed here.

RESULTS

CASE 1

W.B., male, 75 years of age, who has hay fever due to sensitivity to ragweed. Both injection therapy with ragweed extract and oral medication with the antihistaminic drugs gave no relief. The first treatment with the iontophoresis of pyribenzamine gave him excellent relief for four days. The second treatment during the height of the ragweed season gave excellent relief for two days. Iontophoresis with normal saline for control purposes gave no relief.

CASE 2

N.V., female, 39 years of age, has hay fever due to sensitivity to ragweed. Both injection therapy with ragweed extract and oral medication with the antihistaminic drugs gave no relief. She was given one treatment during the ragweed season and received relief for one week. A control treatment with normal saline gave no relief.

CASE 3

Z.P., female, 19 years of age, who is suffering from vasomotor rhinitis. She was complaining of dryness, stuffiness and running of the nose. One treatment gave her dryness for one day.

CASE 4

M.L., female, 59 years of age, who has hay fever due to ragweed sensitivity. Injection therapy with ragweed extract and oral medication with the antihistaminic drugs gave no relief. She received one treatment with the iontophoresis of pyribenzamine. This gave her excellent relief for one day.

CASE 5

A.K., female, 23 years of age, suffering from hay fever due to sensitivity to ragweed. She received no relief from injection therapy with ragweed extract nor from oral medication. She was given one treatment which caused her to have some slight running of the nose which was followed by complete relief for twenty-four hours. No relief was obtained from a normal saline control.

CASE 6

A.J., female, 62 years of age, who has hay fever due to sensitivity to ragweed. Both injection therapy with ragweed extract and oral medication with the antihistaminic drugs gave no relief. The first treatment with the iontophoresis of pyribenzamine gave her excellent relief for four days. The second treatment during the height of the ragweed season gave excellent relief for one day and slight relief for three days. The third treatment gave the same amount of relief as the second treatment did.

CASE 7

M.H., female, 28 years of age who has allergic perennial rhinitis. She received one treatment. There was a slight amount of injection. The patient had good relief for over seven days. No relief was obtained from a normal saline control.

CASE 8

R.B., female, 16 years of age who has allergic perennial rhinitis and polyps. She received one treatment with relief for about three hours. It was difficult in this case to insert the electrode.

CONCLUSIONS

Five cases of allergic seasonal hay fever received treatment by iontophoresis of pyribenzamine. All these cases had received injection therapy and therapy with antihistaminic drugs with no benefit. However, with the iontophoresis of pyribenzamine we were able to obtain relief for a period of one to four days. In each case relief was noted as an absence of rhinorrhœa, sneezing and other symptoms. Two cases of allergic perennial rhinitis received relief. One case was relieved for over seven days while the other only for a few hours. We feel that the lack of relief in the latter case was due to mechanical difficulties. One case of vasomotor rhinitis was treated and she complained of subsequent dryness of the nose. This was an accentuation of a symptom which she complained of before the treatment.

It appears therefore that this method may be of value in the treatment of allergic rhinitis which does not respond to any other therapy. It is probable that better relief may be afforded by using a higher concentration of pyribenzamine in the aqueous solution, and by a longer period of exposure to the iontophoresis. Some controls were used without benefit.

It is intended to evaluate this method with a further series of cases.

SUMMARY

A new treatment of allergic rhinitis by the iontophoresis of pyribenzamine has been presented. This therapy has promise of being of value where injection therapy and oral medication with the antihistaminic drugs has failed.

Pyribenzamine was kindly supplied by Ciba Pharmaceutical Products Inc.

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FOOD AND MEDICINE FROM PINE TREES.—A new source of raw material for the chemical industry is the pine tree. Experiments have already shown that it is possible to extract fats, natural insecticides, vitamins and hormones from the wood that is at present thrown away as useless after the production of cellulose. Turpentine and resin are usually obtained from the pine tree, but recently it has been discovered that the sapwood contains certain important chemical compounds such as fats. It is this sapwood which is wasted, and which scientists at the U.S. Army Quartermaster's Research and Development Laboratories, Philadelphia, are trying to reclaim for the good of man.—(Unesco Features.)

INHIBITION OF CHLOROFORM-ADRENALINE FIBRILLATION BY ANTIHISTAMINICS

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MANY of the antihistaminics and local anæsthetics possess similarities in structural formula which are reflected in properties common to both groups of compounds. Thus both inhibit allergic reactions to various degrees[1, 2] and both possess local anæsthetic properties. Rosenthal and Minard[3] found that Fourneau's compound 929, one of the first antihistaminics to be studied, exerted a local anæsthetic effect which exceeded that of procaine in intensity and duration. Similar observations were made by Leavitt and Code when benadryl[4, 5] and pyribenzamine[4] were injected into the skin of humans. Antistine also possesses local anæsthetic properties.[21]

The use of procaine to control cardiac arrhythmias followed Shookhoff's[6] observation that procaine raised the threshold for the induction of extrasystoles in the frog heart. This observation was confirmed and extended by Van Dongen[7] and later by Wiggers and Wegria.[8] The latter elicited ventricular extrasystoles or fibrillation by the application of brief D.C. shocks to the heart. Although procaine raised the threshold for both types of arrhythmia, the heart did not become completely refractory to the development even with relatively large doses of procaine, 8 to 10 mgm./kgm.

Mautz[9] observed that the intrapericardiac injection of procaine rapidly abolished tachycardia and auricular fibrillation which appeared in dogs during the course of thoracic surgery. Beck and Mautz[10] found that manipulation of the heart which ordinarily produced serious or even fatal arrhythmias could be performed with impunity following application of procaine to the hearts' surface. Burstein[11] confirmed these findings in humans, in whom handling of the heart in the course of cardiac surgery led to the appearance of arrhythmias. Procaine has also

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protected against the development of ventricular fibrillation in animals injected with adrenaline in combination with chloroform,[12] benzol[13] and cyclopropane[13] and similarly, it has prevented adrenaline-induced tachycardia.[14] Clinically, Kraft[15] has shown that the arrhythmias which appear during cyclopropane anæsthesia may be rapidly eliminated by the intravenous administration of 5 to 10 c.c. of 1% procaine.

Presumably, the above properties of procaine reside in its ability to depress irritable foci in the myocardium. Several of the antihistaminics also possess a potent local anæsthetic action. It was therefore decided to test them for possible antifibrillary activity since the feasibility of administering them by mouth might afford a wider clinical application than has been possible with procaine.

PROCEDURE

Dogs were anæsthetized with sodium pentobarbitol 25 mgm./kgm. intravenously. A tracheal cannula was inserted and to this, a perforated tube was attached. If the animals breathed spontaneously, oxygen was added at a slow rate. Otherwise an intermittent pump was used to artificially maintain the respirations. A chloroform bottle was inserted into the system so that the ingoing air or oxygen could be diverted in varying degree through this channel and thus deliver chloroform to the dogs. In all cases, chloroform was administered for six minute periods and in a concentration which yielded only a slight drop in blood pressure. After five minutes of chloroform, adrenaline 0.02 mgm./kgm. was injected intravenously as rapidly as possible. This procedure, according to Melville,[15] regularly induces ventricular fibrillation. The antihistaminics pyribenzamine* or antistine* were given intravenously prior to, or in the same syringe as the adrenaline. The volume of the adrenaline solution when given alone or combined with antihistaminic varied from 1 to 5 c.c. from animal to animal. The volume of repeated injections in any one dog was kept constant. When fibrillation failed to occur, the chloroform and adrenaline were repeated at intervals. Although the antihistaminics were also repeated in some cases, eventually all dogs were subjected to chloroform and adrenaline without antihistaminics.

OBSERVATIONS

Four dogs were used as controls and all rapidly fibrillated following injection of adrenaline. From Tables I to IV it may be seen that pyribenzamine and antistine when given simultaneously with adrenaline prevented the occurrence of ventricular fibrillation. The protection was inconstant and the effect of single doses usually lasted less than fifteen minutes. An example of this brief duration of protection is given in Fig. 1 Two mgm./kgm. of pyribenzamine afforded protection against the first administration of chloroform and adrenaline. The chloroform-adrenaline procedure was repeated eighteen minutes later without pyribenzamine and this time ventricular fibrillation promptly developed. Only when large doses of antihistamine were used did the protective effect last over an hour. Similar observations were made when the antihistaminics were injected prior to the chloroform-adrenaline. In addition to the tabulated results, pyribenzamine was administered by intravenous drip. Doses of 0.2, 0.3 and 0.44 mgm./kgm./min. injected for 40, 32, and 25 minutes respectively, were ineffective. When the injection rate was 0.5 mgm./kgm. for 28 minutes fibrillation failed to occur. The protection here too was short-lived. The drip was discontinued 4 minutes after the first injection of adrenaline. Repetition of the chloroform-adrenaline administration fourteen minutes later resulted in fibrillation.

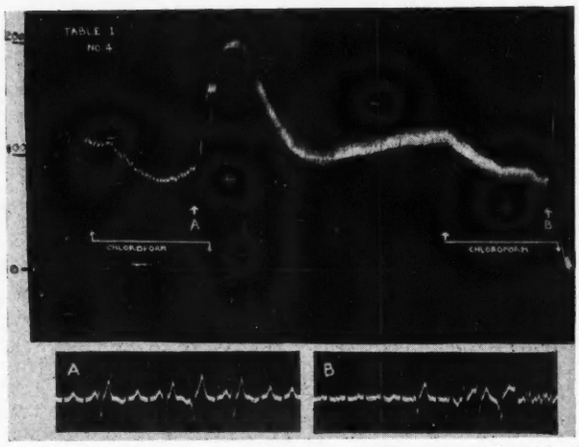

Fig. 1.—Male dog 16.7 kgm., sodium pentobarbitol anæsthesia. Blood pressure and electrocardiogram tracings. At A, adrenaline 0.02 mgm./kgm., and pyribenzamine 2.0 mgm./kgm. were injected intravenously. At B, eighteen minutes later, the same quantity of adrenaline was injected without pyribenzamine.

COMMENT

Since procaine in doses of 5 mgm./kgm. has been reported as preventing chloroform-adrenaline fibrillation with the effect lasting over an hour[12] it is apparent that the antifibrillary action of pyribenzamine and antistine is inferior to that of procaine. This is of interest, since pyribenzamine has been found to be a more potent local anæsthetic than procaine.[4] This suggests that the antifibrillary action of procaine is referable to some property in addition to the direct suppression of irritable foci in the myocardium. The investigations of Brow, Long and Beattie[17] established that the heart must

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TABLE I.

EFFECTS OF PYRIBENZAMINE CO-TREATMENT ON CHLOROFORM-ADRENALINE FIBRILLATION

No.	Wt.	Sex	First injection Pbz.	First injection Adr.	Result	Interval Inj. 1–2	Second injection Pbz.	Second injection Adr.	Result	Interval Inj. 2–3	Third injection Pbz.	Third injection Adr.	Result
	kgm.		(mgm./kgm.)	mgm.									
1	8.25	F	2	0.18	+								
2	9.0	F	2	0.18	+								
3	16.5	M	5	0.33	+								
4	16.7	M	2	0.34	–	18″	0	0.34	+				
5	16.7	F	5	0.34	–	20″	0	0.33	+				
6	14.4	M	5	0.29	–	40″	5	0.29	–	50″	0	0.29	+
7	7.7	M	6	0.15	–	25″	3	0.15	–	25″	1	0.15	+
8	20.7	F	10	0.41	–	20″	5	0.41	–	75″	2	0.41	–*

*Chloroform-Adrenalin alone 80″ later—no fibrillation
+Ventricular Fibrillation.

TABLE II.

EFFECTS OF PYRIBENZAMINE PRE-TREATMENT ON CHLOROFORM-ADRENALINE FIBRILLATION

No.	Wt.	Sex	Pbz.	Injection period	Interval prior to chloroform	Result of first adren.	Interval between chloroform 1 and 2	Result of second adren.
			(mgm./kgm.)					
1	10.1	F	5	15″	5″	+		
2	5.8	M	10	2″	15″	+		
3	14.4	M	15	8″	20″	+		
4	10.2	F	4	3″	5″	–	50″	+
5	6.0	F	10	2″	10″	–	40″	+

TABLE III.

EFFECT OF ANTISTINE CO-TREATMENT ON CHLOROFORM-ADRENALINE FIBRILLATION

No.	Weight	Sex	First injection Antist.	First injection Adr.	First injection Result	Interval between injections	Subsequent injections Antist.	Subsequent injections Adr.	Subsequent injections Result
	(kgm.)		(mgm./kgm.)						
1	15.0	M	10	0.30	+				
2	6.0	M	10	0.12	–	15″	0	0.12	+
3	4.4	F	10	0.09	–	25″	5	0.09	+
4	7.0	F	20	0.14	–	20″	0	0.14	–
						20″	0	0.14	–
						20″	0	0.14	–
						15″	0	0.14	–
						30″	0	0.14	+
5	7.0	M	20	0.14	–	20″	20	0.14	–
						20″	0	0.14	–
						25″	0	0.14	–
						20″	0	0.14	–
						15″	0	0.14	–

TABLE IV.

EFFECT OF ANTISTINE PRE-TREATMENT ON CHLOROFORM-ADRENALINE FIBRILLATION

No.	Wt.	Sex	Antistine	Interval prior to chloroform	Adrenaline No. 1	Interval between Adrenaline No. 1 and 2	Adrenaline No. 2
			(mgm./kgm.)				
1	11.8	M	10	5″	+		
2	11.4	F	20	10″	–	15″	+

possess an intact sympathetic innervation to acquire a hyperirritability following the administration of chloroform, and recently similar findings have been made with regard to cyclopropane arrhythmias.[18, 19] As procaine blocks transmission across the superior cervical sympathetic ganglion of the cat,[20] it is possible that part of the antifibrillary action of procaine resides in its ability to functionally interrupt the sympathetic pathway to the heart. We are not aware of any such studies with reference to antihistaminics.

CONCLUSIONS

Pyribenzamine and antistine in relatively large doses inhibit the development of ventricular fibrillation when adrenaline is given to dogs sensitized by chloroform. The effects are inconstant and of short duration. Protection lasting more than an hour was observed only when large doses of antihistaminic were used.

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EFFECT OF ANTIHISTAMINICS ON ARRHYTHMIAS FOLLOWING CORONARY ARTERY LIGATION

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FOLLOWING ligation of the circumflex branch of the left coronary artery of conscious dogs, about 70% rapidly succumb to ventricular fibrillation.[1] In humans the sudden deaths in the early phase of acute myocardial infarction are also due to this arrhythmia. In several instances, electrocardiograms taken fortuitously at the time of death, have recorded typical ventricular fibrillation.[2 to 5] In both humans[5, 6] and animals,[7, 8] the rôle of ventricular extrasystoles as the pre-fibrillation arrhythmia has been stressed. Electrograms recorded directly from the surface of the heart indicate that the borderline ischæmic area of the infarcted myocardium acts as an irritable focus in which the ectopic beats originate. These multiple foci ventricular extrasystoles progressively increase in frequency until they terminate in fibrillation.[7] An analysis of cases of myocardial infarction at the Mayo Clinic, revealed that where the incidence of ventricular extrasystoles was less than one per ten beats, all patients survived the early acute phase, whereas all of seventeen patients with a greater incidence of ventricular ectopic beats experienced an early demise.[5] One would therefore anticipate that procedures which could suppress extrasystoles, would reduce the death rate from ventricular fibrillation.

Efforts in this direction have followed along three general lines. Interruption of the sympathetic nerve supply of the heart, surgically,[9 to 12] or by means of sympathicolytic drugs[13] has effectively reduced the incidence of ventricular fibrillation following coronary artery ligation. Secondly, the xanthines,[14] atropine,[14] and papaverine[15] have been advocated primarily because their coronary dilator action would tend to reduce collateral spasm. Recent evidence suggests that ventricular fibrillation occurs independent of collateral vascular spasm,[16] and the concept that spasm causes fibrillation will probably fall by the wayside. The various coronary dilators are known to have a direct action on the myocardium[17 to 19] and their anti-fibrillation power is probably referable to this feature. The third line of approach includes drugs such as quinidine[20] and 1262F[21, 22] which reduce myocardial irritability by prolonging the refractory period.

In the present experiments, the antihistamine drugs, pyribenzamine and benadryl were tested for the ability to inhibit the development of arrhythmias following coronary artery ligation. The investigations were undertaken for several reasons. One of us had previously observed that histamine-induced anoxia in the rabbit is frequently accompanied by ventricular fibrillation.[23] This arrhythmia did not appear when the anoxia was induced by clamping the trachea. This suggested the possibility that following myocardial infarction, the liberation of histamine from necrotic heart muscle might be one

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of the factors responsible for fibrillation. If this were the case, the antihistaminics might prove of benefit. In addition, it was felt that the antihistaminics, by virtue of their potent local anæsthetic properties,[24, 25] might suppress the foci of irritability. Finally, the previously noted reduction in the incidence of fibrillation by removal of sympathetic nervous influences[9 to 12] suggested the possible etiological rôle of adrenaline or sympathin. The authors have shown that antihistaminics afford a certain amount of protection against chloroform-adrenaline fibrillation.[26]

PROCEDURE

The experimental animals were male and female dogs of varied weights. They were anæsthetized with sodium pentobarbital, 25 mgm./kgm. intravenously, and a tracheal catheter was inserted. With the animals postured on their right side, the heart was approached through the left fourth interspace and when the pleural cavity was entered, respirations were maintained by an intermittent positive pressure pump operating through the tracheal cannula. The circumflex branch of the left coronary artery, which is the main artery in the dog,[1] was dissected free and looped at its origin. In experiment A, the loop was tightened as soon as the corneal reflex returned and the chest was then sewn up with the lungs well inflated. In experiment B, the procedure of Manning *et al.*[1] was followed. After loosely looping the circumflex artery at its origin, the free ends of the ligature were led out of the chest at the ends of the incision and the chest was closed. Abundant slack was allowed to prevent closure of the loop by the movements of the thoracic viscera. On the day following the operation, when the dog was fully conscious, the loop was tightened by traction on the free ends of the ligature.

OBSERVATIONS

Experiment A.—Seven dogs served as controls and all seven succumbed within twenty-four hours of ligating the circumflex artery. In three of these, we were able to obtain electrocardiograms just before death and in each instance, ventricular fibrillation was recorded.

Seven dogs were given benadryl intravenously in doses of 2 to 7 mgm./kgm. in one or two injections. The ligature about the circumflex artery was tightened, five to forty-five minutes after the benadryl was administered. Five of the seven dogs promptly developed ventricular fibrillation. An additional dog was found dead the next morning and one dog survived.

In two dogs, pyribenzamine was injected intravenously in doses of four and fifteen mgm./kgm. respectively. It was administered in divided doses over a fifteen minute period before the circumflex loop was tightened. A third dog received 26 mgm./kgm. by various parenteral routes, in divided doses over a period of one hour. In all three cases, ventricular fibrillation occurred within ten minutes of ligating the circumflex artery. It appeared then that neither of these two drugs had any favourable effect on the outcome when the occlusion was performed in anæsthetized dogs. At this point, the experimental procedure was altered to conform with that of Manning *et al.*[1] in which the occlusion is carried out in conscious dogs.

Experiment B.—On the day following placing of the loose circumflex loop, twelve dogs were given three to five mgm./kgm. of pyribenzamine in single or divided doses by the hypodermic and/or intramuscular route. Some ten to thirty minutes after the injections were started, the free ends of the circumflex loop were pulled taut so as to occlude the circumflex artery. Five of the twelve dogs died immediately of ventricular fibrillation. Some two to five hours after ligation the seven survivors were given an additional intramuscular injection of pyribenzamine, 5 mgm./kgm. suspended in an oil-wax medium to obtain prolonged absorption. Three of these were found dead in their cages on the morning following ligation. The twenty-four hour mortality rate was therefore 66%. Since Manning and co-workers[1] obtained essentially similar mortality

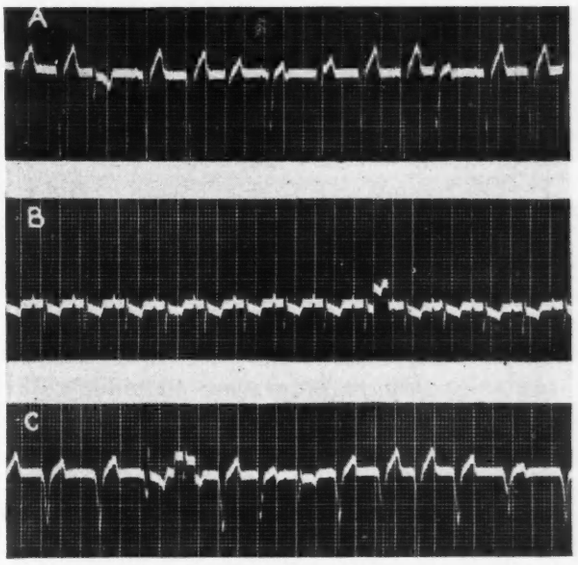

Fig. 1.—Male dog, 11.3 kgm. (A) was recorded the morning following ligation of the anterior descending branch of the left coronary artery and shows very numerous ventricular extrasystoles. (B) was recorded a few seconds after pyribenzamine 4 mgm./kgm. was injected intravenously, and reveals complete disappearance of extrasystoles. A tracing made 80 minutes later (C) shows return of the extrasystoles.

figures in a control series of dogs, it is apparent that pyribenzamine was of no benefit.

Although pyribenzamine and benadryl were unable to alter the mortality rates, they nevertheless were able to suppress the appearance of ventricular extrasystoles to a limited extent. An example is seen in Fig. 1. The anterior descending branch of the left coronary artery was ligated while the dog was deeply anæsthetized with sodium pentobarbital. The next morning numerous ventricular extrasystoles were recorded (1A). Pyribenzamine 4 mgm./kgm. (4 c.c.) was administered intravenously rapidly and within a few seconds, the arrhythmia had completely disappeared (1B). Tracings were made some 80 minutes later and the extrasystoles had returned (1C). The effect of pyribenzamine, though dramatic, was of rather short-lived duration. A similar experience was noted with benadryl.

SUMMARY

Pyribenzamine and benadryl temporarily reduce the enhanced irritability of the myocardium which appears following ligation of a coronary artery of the dog. Ventricular extrasystoles in some cases were completely suppressed. The effect, however, was of insufficient constancy and duration to modify the twenty-four hour mortality rate following occlusion of the circumflex branch of the left coronary artery.

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CASE REPORTS

POST-PARTUM HEART DISEASE

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The occurrence of an unusual form of heart disease complicating the puerperium has been recognized by various writers since Virchow first referred to it in 1870. The clinical picture has recently been well described by Melvin. The present case appears to present many of the features of this poorly-understood disease.

R.B., white female, 31, was admitted April 21, 1948, complaining of pain behind the lower sternum radiating through the left scapular region.

Her past history revealed several previous admissions, as follows: August, 1942, varicose veins. February, 1947, pregnancy at term. She had a normal labour except that her blood pressure dropped to 90/48 after four hours' labour. She developed phlebitis in both legs following delivery, and was treated with sulfathiazole. February, 1948, pregnancy at term. Normal labour, followed by superficial thrombophlebitis which was treated with sulfadiazine. March, 1948, severe steady pain in the centre of the chest, radiating to the right and to the interscapular region. It lasted 1½ hours, when she was relieved by an injection, but she had persisting "soreness".

At this time she stated that she had had similar pain following the births of her last three children, in 1939, 1947, 1948. In 1939 and 1947 she had stayed in bed six weeks, without medical attention, and her pain subsided.

In 1943 she had had a short illness consisting of epigastric pain, usually coming on in the evening, without nausea or vomiting; and bouts of nocturnal dyspnœa during which she had to sit up in bed to get her breath. A doctor was not consulted. Both the patient and her mother denied any episodes of rheumatic fever.

On this admission her heart was not considered enlarged. Her blood pressure was 89/64. A diagnosis of pulmonary embolism was made. Her left leg was bandaged with elastoplast and she was allowed home in ten days.

April 21, 1948. At this time she stated that three weeks previously she had suddenly had a recurrence of her retrosternal pain, which lasted two hours and was associated with dyspnœa. She had persisting weakness thereafter but did not remain in bed. April 15 the pain returned and extended through to the left posterior thorax. It continued intermittently until admission, and was associated with dyspnœa, cough with bloody sputum, nausea and vomiting.

Her temperature was 97.2°, pulse 96, respirations 22. The important physical findings were as follows: the cardiac apex was in the left axilla. The heart rate was 110, regular. The second pulmonary sound was louder than the second aortic sound. A Grade 4 mitral systolic murmur was heard. The blood pressure was 110/80. The liver was enlarged three fingers' breadth below the right costal margin and was slightly tender. The spleen was not palpable.

The hæmoglobin was 82%, red cell count 4,380,000, white cell count 10,600, with a normal differential. The sedimentation rate was 1 mm. in 60 minutes, the prothrombin time 23 seconds, the Kahn negative. The urine contained 100 mgm. albumen per 100 c.c., and 1 or 2 white and red cells per high power field. X-ray

showed an enlarged heart. The left diaphragm was elevated, and there was a relative ground glass opacity throughout the right lung. An electrocardiogram was abnormal (see figure). The chest leads were suggestive of coronary insufficiency, but not of recent infarction.

The patient was digitalized and improved. The liver enlargement diminished. On May 9, she was taken to the x-ray department for further study, but developed more pain, this time in the epigastrium, which was succeeded by more venous distension and palpable enlargement of the liver. With further rest her signs of failure cleared, and she was allowed home by ambulance, to remain in bed there. Throughout this stay in hospital there was no fever. At home her condition became worse. She began to suffer epigastric pain and intractable nausea and vomiting, and was apathetic and depressed.

Final admission on *May 21, 1948,* her temperature was 97°, pulse 128, respirations 30. Her venous distension was marked, and there was slight cyanosis. Her chest now showed dullness at both bases with diminished breath sounds. No adventitious sounds were heard. Her cardiac enlargement was as before; the rhythm was regular, and a gallop rhythm was heard. The systolic murmur was again heard at the apex, with propagation

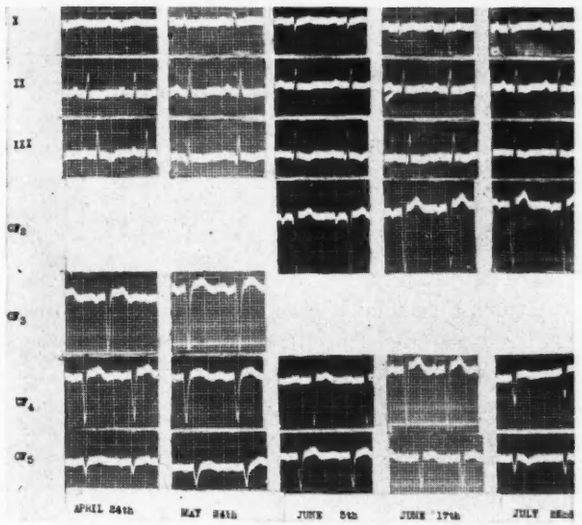

Fig. 1.—The electrocardiogram of April 24 shows a sinus rhythm at a rate of 93. The P waves are normal in the limb leads, and inverted in the chest leads. P - R interval 0.16 seconds, QRS 0.08 seconds, with right axis shift. There is a tiny Q wave in all three limb leads; the QRS in the chest leads is a QS. T_1 is low and upright; $ST_{2\&3}$ slightly depressed, convex upwards, and followed by asymmetric inverted T waves. The ST take-off in the chest leads is within normal limits and is followed by an upright T. The limb leads suggest right ventricular strain. The chest leads show an absence of the initial positive deflection that suggests transmural infarction. Subsequent tracings reveal minor variations in the P waves, the P - R interval, the QRS deflection, and the ST segments. None of the changes are marked or specific. The only inverted T in the chest leads occurs on July 22 in lead CF_5.

along the left border of the sternum and around the axilla into the back. Blood pressure 98/80; the systolic pressure fell markedly with inspiration.

The liver was enlarged a handsbreadth below the right costal margin, and was tender. There was no ascites, but pitting œdema was present over the tibia, and tenderness in the right thigh. Fluoroscopy showed the heart to be larger than on the previous admission; a barium swallow showed no gross enlargement of the left auricle.

Her circulation times were: (1) Arm—tongue (calcium gluconate) 39 sec. (2) Arm—lung (ether) 25 sec.

She was put on a salt-free diet, given nembutal by rectum to control her vomiting, and re-digitalized; she was given salyrgan—theophylline intravenously, at intervals, and vitamin B complex by mouth. Her epigastric pain and nausea continued, and she vomited at least once every day; this increased in frequency as her disease progressed. June 9 she developed progression of the thrombophlebitis in the right thigh. Additional complaints at this time were headache, tinnitus, weakness with sweating, lumbar pain and vaginal discharge. June 23 there was a sudden pain in the left chest with the subsequent production of blood-tinged sputum. A transient pleural friction rub was heard, but there was no rise in temperature. Cough and bloody sputum continued, and in both lungs rhonchi and scattered median râles were audible. Œdema of the legs increased. Cyanosis was particularly noticeable during vomiting. Dyspnœa was not a marked feature until the middle of July. She gradually became weaker and more drowsy; pain and vomiting subsided somewhat and she expired quietly July 29, about 5 months after the onset of her illness.

Laboratory studies throughout her last illness showed a gradual rise in hæmoglobin concentration from 60% May 25, to 90% July 14. The red cell count rose with this. She had a persisting leukocytosis, the counts varying between 8,500 and 13,000, with a normal differential and no abnormal cells. Her sedimentation rate was repeatedly normal. One blood culture was sterile. Her urine contained from 30 to 100 mgm. of albumen per 100 c.c. with a few occasional red and white cells. Her sputum contained no tubercle bacilli; culture revealed mainly *micrococcus catarrhalis,* non-hæmolytic streptococcus, and a rare colony of pneumococcus. Vaginal smear showed *trichomonas vaginalis.* Her blood sugar was 86.4 mgm. % and her non-protein nitrogen 25.3 mgm. %.

Autopsy (three hours after death).—Thorax: The right pleural cavity contained 400 c.c. of serosanguinous fluid; the left pleural cavity was dry. There were no adhesions. The lungs were similar to each other, small, collapsed, grayish-pink in colour; with numerous firm nodules scattered throughout all lobes. Most of these masses were based on the pleural surfaces; they were reddish brown in colour and several projected above the surrounding lung surface. On section some were typical wedge-shaped infarcts, others were rounded masses outlined by a zone of fibrous tissue, the color of the cut surface being mottled brown. The remainder of the lung surfaces was reddish-gray with some mottled areas of a darker red. Both lungs were air-containing and floated. There were no emboli or thrombi in the major divisions of the pulmonary arteries. The bronchial tree was not abnormal. The pericardial sac contained an increased amount of yellowish brown clear fluid. The pericardial surface of the heart was smooth and glistening with no "milk spots" or adhesions. Near the apex of the heart on the anterior surface was a faint, rather diffuse, whitish scarring.

The heart was enlarged, but very soft and flabby. The right auricle was dilated, but was otherwise normal, containing no mural thrombi. The tricuspid valve was not deformed or thickened, and presented no vegetations. The right ventricle was dilated, the wall rather thin and soft, with no apparent hypertrophy; there were no mural thrombi. The pulmonary valve was normal. The mitral valve admitted two fingers readily, three with difficulty. The valve cusps were thin, there was no shortening of the chordæ tendineæ, no vegetations.

The left ventricle was dilated. The myocardium did not appear hypertrophied. Halfway down the ventricle the normal reddish-brown colour of the endocardium abruptly changed to a dead whitish appearance of the trabeculæ carneæ and underlying muscle. This change extended through the apex of the ventricle and the lower 1/3 of the interventricular septum. The apex of the ventricle was thinned. Partly covering this, and filling the gaps between the trabeculæ, were mural thrombi. The myocardium adjacent to this area of fibrosis appeared flabby and softened. A cut through

the posterior wall of the ventricle and the interventricular septum revealed diffuse fibrosis of the myocardium.

The aortic valve was normal; the aorta showed minimal atheroma. The coronary arteries were explored and found to be thin-walled and patent throughout, with no areas of atheroma, thrombosis or embolism.

The peritoneal cavity contained about 700 c.c. of yellowish free fluid. There were a few adhesions binding the cæcum and omentum to the abdominal parietes. The stomach was congested, with a very small pyloric antrum. The liver was enlarged and nut-meg in appearance. One kidney contained a grape-sized cyst. The bladder was notable for the presence of submucosal varices. The cervix of the uterus showed a greenish exudate. Both common and external iliac veins contained thrombi, partly adherent to the vein wall.

The skeletal and nervous systems were not examined.

Microscopically the heart showed myocardial hypertrophy with focal areas of necrosis in which were seen a few lymphocytes and mononuclears; near these areas there were fragmented swollen myocardial fibres in which were seen swollen nuclei. There was a fresh acute and a partially organized thrombus on the endocardium of left ventricle. In some areas there was a marked scarring of myocardium with fibrosis.

Other organs showed only chronic congestive changes. The lung sections showed the effects of multiple emboli from the thrombophlebitis noted clinically.

The pathological findings here were consistent with those described in the literature concerning this condition. In the heart the findings resembled those described by others although in the focal lesions there were no neutrophile or eosinophile polymorphonuclear leucocytes. The mural thrombosis in the left ventricle apparently was secondary to the myocardial damage. The arteriolar sclerosis noted in the kidneys in some cases was absent but there were some congestive changes.

The features of post-partum heart disease which may be emphasized are its onset within six weeks following delivery, with congestive failure usually manifested, the frequency of pain in the chest suggesting coronary insufficiency; episodes of embolism, mainly pulmonary; the varying degree of hypertension; the non-specific and relatively constant abnormalities in the electrocardiogram; the resistance to usual methods of treatment; and the usually good prognosis.

The case reported differed somewhat in having a low blood pressure, with low pulse pressure, and in terminating fatally.

SUMMARY

A case of post-partum heart disease is presented. It is probable that she had episodes of cardiac damage following the birth of her last three children, in 1939, 1947 and 1948. Following the last child she developed congestive heart failure and died five months postpartum. At autopsy the apical half of the left ventricle and interventricular septum was largely replaced by scar tissue with some evidence microscopically of recent necrosis and subacute inflammation. The coronary arteries were normal.

The cause of this condition is unknown.

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METASTASIS OF BRONCHOGENIC CARCINOMA TO THE THUMB

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Some malignant diseases are notorious in giving rise to their secondary deposits in diverse and unusual situations. Primary carcinoma of the bronchus is such a tumour. When one is faced during the performance of one's routine duties with an example of such tumour behaviour there is occasioned much surprise and even incredulity.

The following is a case record we considered worthy of publishing as an example of a most unusual manner in which carcinoma of a bronchus presented itself.

The patient, a male, aged 59 years, a clerk, was referred to one of us (E.F.R.) on November 13, 1948. His only complaint was of a sore right thumb. He stated that he had twisted the thumb three weeks previously whilst lifting a heavy transfer case. Pain and swelling occurred three or four days later. During the succeeding weeks the skin became reddened and an intractable throbbing pain gradually increased in intensity. On examination the thumb presented a diffuse swelling particularly over the proximal phalanx, accompanied by local heat and tenderness. There was nowhere a breach of the skin surface. All the clinical findings suggested an inflammatory process.

X-ray examination of the hand revealed a marked destruction of the proximal phalanx of the thumb (Fig. 1). The patient was admitted to the Halifax Infirmary, where on the basis of an inflammatory bone lesion, intramuscular penicillin, in doses of 20,000 units every four hours, was given for three days. There was no clinical response to this therapy.

An aspiration needle was inserted and only a few drops of blood were obtained. On November 19, 1948, under general anæsthesia, and employing tourniquet control, a medial incision exposed obvious tumour tissue. There was an apparent encapsulation, yet it could not be shelled out like a benign tumour and it had not the appearance of an osteoclastoma or a giant-cell synovioma. The tumour was removed by curette as thoroughly as possible, leaving a shell of bone distally and on the lateral side. The wound was closed, and a pressure dressing beneath a moulded plaster splint, was applied. The wound healed by primary intention.

Pathological examination of the curetted tissue revealed an epidermoid carcinoma of a large basal-cell rather than a plexiform squamous type (Fig. 2). However, an occasional cell nest structure was seen. Many

small cystic spaces were ringed by several layers of very uniform tumour cells. The growth was entirely osteolytic, though its vascularity was poor. The stroma was acellular and composed of coarsely reticulated fibrous tissue showing no evidence of new or dead bone or osteoid matrix. The growth was pronounced as a secondary tumour invading the proximal phalanx of the thumb and the suggested primary site was bronchial epithelium.

After a discussion upon the histological findings a very detailed history was taken and a thorough clinical search was made for evidence of a primary neoplasm. No single new complaint was elicited. An x-ray examination of the chest on November 25, 1948, revealed evidence of an area of collapse involving the apical segment of the right upper lobe. The interlobar fissure was curved upwards, and the heart and mediastinum showed slight displacement to the right. The left lung was clear. Dr. C. J. Beckwith examined the patient and noted in his report that there had been no complaint of symptomatology of any type, subjectively or objectively during the past year. There was slight dullness to percussion and some rhonchi high in the right axilla. A fluoroscopic examination of the chest revealed a well-marked density above the third rib more sharply defined than in the previous x-ray film. Planographs were taken and are reproduced in Figs. 3 and 4.

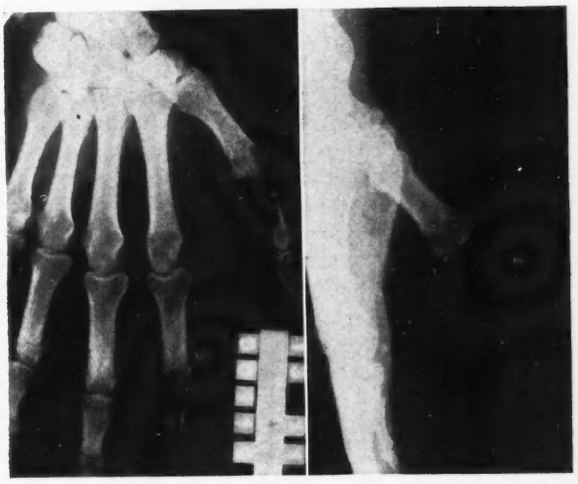


Fig. 1.—Radiograph of the thumb prior to first operation.

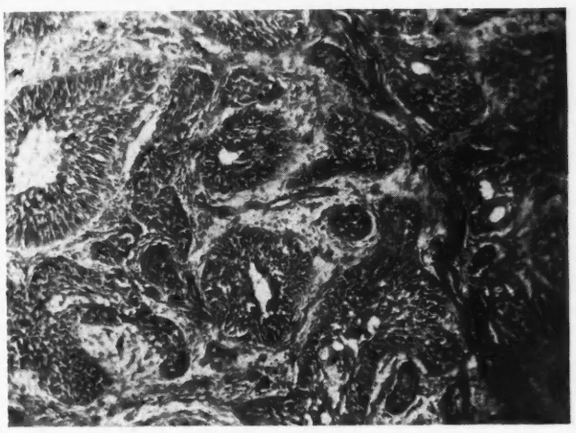
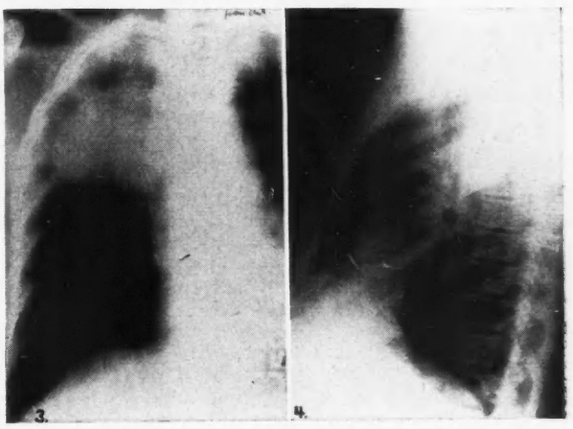


Fig. 2.—Microscopical appearances of the tumour removed from the thumb.

A bronchoscopic examination was carried out at the Victoria General Hospital by Dr. D. M. MacRae. It showed a normal right main bronchus but the right upper lobe orifice could not be directly visualized due to retraction, nor could the main bronchus be displaced with the bronchoscope to permit visualization of the upper lobe bronchus because of the fixity of structures in this region. Specimens of secretion were taken and slides prepared for staining by Papanicolaou's technique. The microscopical appearances of the bronchial smears revealed many malignant cells in all stages of mitotic division and many others showing degenerative changes. It was impossible to be certain of the histological type of neoplasm from these smears.

The clinical progress and the subsequent treatment of the patient were as follows: On December 27, there was recurrence of the swelling of the right thumb and he was again admitted to the Victoria General Hospital where on December 30, the right thumb and metacarpal bone were removed at the carpo-metacarpal articulation to prevent an ulcerating lesion of the thumb. This wound has healed primarily and there has been no evidence of any local recurrence since that time.

The patient has gradually gone down hill and now has developed a metastasis at the left sterno-clavicular joint and has had two minor episodes of hæmoptysis. The present picture is that of rapidly advancing malignancy of the lung.



Figs. 3 and 4.—Anterior and lateral x-ray planograph views of the lung tumour.

DISCUSSION

This is a further recorded example of the unusual manner in which a bronchial carcinoma may make itself manifest. Other reported cases of an identical nature are very few. Smither and Price[1] described a case of primary bronchial carcinoma with a metastasis in a terminal phalanx. There was a painful and fluctuant swelling suggesting a whitlow, and it was by aspiration biopsy that an anaplastic squamous carcinoma was diagnosed. Colson and Willcox[2] reported three cases of phalangeal metastases in bronchogenic carcinoma. In one of their cases such a secondary deposit was, as in our own case, the presenting symptom. In all three cases the phalangeal metastases clinically resembled an inflammation and were initially assumed to be due to a paronychia or whitlow. Willis[3] states that secondary growths in the digits are very rare

and refers to two such reported cases of metacarpal and phalangeal metastases respectively. He goes on to say that these metastatic tumours are osteolytic and destructive, often causing pathological fractures and often invading surrounding soft tissues. They may also show pulsation and be mistaken for aneurysms.

In our own case we could only conjecture whether the twisting injury initially complained of had actually played any part in the arrest and growth of tumour emboli in this unusual situation, or whether such an injury was coincidental and minor, being mentally magnified in retrospect when the swelling of the thumb developed.

SUMMARY

A case of asymptomatic bronchial carcinoma in a male aged 59 years is reported, which manifested its presence by metastasizing to the proximal phalanx of the right thumb and there giving rise to the symptoms and signs of an inflammatory bone lesion.

NOTE.—Since the submission of this paper we have to report the death of the patient. No autopsy was obtained.

We wish to thank Dr. C. J. Beckwith, Medical Superintendent of the Halifax Tuberculosis Hospital, Dr. D. M. MacRae and Dr. R. L. Smith of the Victoria General Hospital, and Dr. C. M. Jones of the Halifax Infirmary for their kind co-operation and skilful assistance in the investigation of this case.

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SPECIAL ARTICLE

LIVER FUNCTION TESTS*

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One of the outstanding developments in medicine during the last thirty years has been the rapid increase in the use of laboratory tests as aids to diagnosis and therapy. Many have proved so useful that medical practitioners regard them with a degree of confidence previously reserved for symptoms and physical signs. This is not true of liver function tests, which provoke in the minds of many practitioners nothing more than confusion. This leads to haphazard use, inspired chiefly by eagerness to try out every new test in the hope that it may prove better than the last. The purpose of this article is to point out that at least some of this confusion can be avoided if a rational plan is followed in the use of liver function tests.

It would be absurd to suggest that all confusion can be dispelled and the subject made simple by laying down a few general rules. The liver is a complex organ, performing a wide variety of functions. It is therefore not surprising to find that between thirty and forty liver function tests are in common use. Liver functions show a marked degree of dissociation. Some functions may be disturbed while others remain apparently unimpaired. This has discouraged dependence on a few tests only and has led to the use of "batteries" of tests. The functional capacity of the liver far exceeds normal needs. Function tests may therefore be disappointing in revealing no impairment in spite of the presence of disease.

These difficulties will be readily admitted by the most enthusiastic advocate of liver function tests. But it must also be recognized that confusion in this field cannot be attributed entirely to the inherent functional complexity and capacity of the human liver. There is an obvious tendency to needlessly increase confusion by failure to adopt any plan in the use of these tests. It is suggested that the following approach may prove helpful.

1. *Decide what type of information is required from liver function tests.*

There is no single test which is suitable for all purposes. Selection must be made on the basis of the type of information required. It follows that thorough investigation of the clinical aspects of the case and the problems involved must precede any decision regarding the use of liver function tests.

2. *Select tests on basis of type of information required.*

Three types of information may be obtained from tests of liver function. First, they may be used to detect liver damage. Examples of tests suitable for this purpose are the estimation of bilirubin in plasma, estimation of urobilinogen in urine, detection of bilirubin in urine, cephalin flocculation test and bromsulphalein test. Second, tests may be used to estimate the degree of impairment of function. Examples of tests suitable for this purpose are the estimation of bilirubin in plasma, estimation of urobilinogen in urine and bromsulphalein test. Third, tests may be used in cases of jaundice to aid in distinguishing between biliary obstruction and hepatic parenchymal damage. Examples of tests suitable for this purpose are the estimation of alkaline phosphatase in serum, estimation of cholesterol in plasma and galactose tolerance test.

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Examples cited are those with which I have had personal experience. Others will be found in the literature. Selection must be governed to some extent by the laboratory facilities available. Practitioners with limited facilities are often dismayed by reports of the usefulness of large batteries of tests. But in most situations much can be learned from a few carefully selected tests in which the practitioner gains confidence through repeated use.

3. *Follow course of disease by frequent repetition of tests.*

When tests have been carefully selected, more is gained by repeating the same tests than by shifting from one type of test to another. This applies especially to attempts to follow changes in the degree of impairment of function.

4. *Interpret results in conjunction with clinical findings.*

Sometimes diagnoses are made or progress is judged on the basis of liver function tests alone. As with all laboratory procedures, tests should be interpreted in conjunction with clinical findings. The emphasis on liver function tests in the current literature should not distract attention from the value of careful analysis of signs and symptoms.

Adoption of this plan should help to dispel some of the confusion in this field. But it is obvious that, without knowledge of the details of a few of the more commonly used tests, general rules will be useless. This knowledge can be gained through consultations with the director of the laboratory in which the tests are done. In this way precise information will be obtained concerning facilities available in that laboratory, techniques of collection of the samples of blood or urine required and interpretation of results.

CLINICAL and LABORATORY NOTES

A REEL DESIGNED FOR HANDLING SILK*

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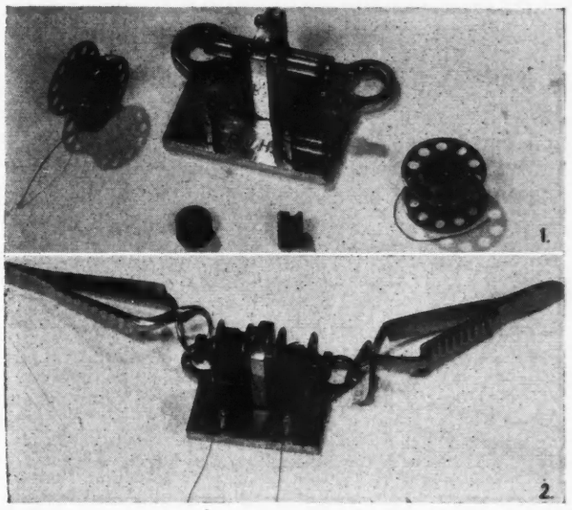
The merits of silk as a suture material are now well established, and in many clinics the silk technique is used in all clean cases. Silk is non-irritating in tissues and possesses great tensile strength for the relative size of the thread. Besides this, it is much more economical than catgut.

For the past fifteen years the silk technique, at the Royal Victoria Hospital, has been facilitated by a simple reel which has many advantages. The device consists of two metal spools mounted on a holder (Fig. 1). The spools are held in position by a knurled nut and can



readily be removed for loading. In use, the holder is attached to the drapes with towel clips and the silk is threaded through a post and reeled off as required (Fig. 2). A spring ratchet working against the spool prevents the silk from becoming loose and unravelling on the spool. This device keeps the thread taut at all times like line on a fishing reel.

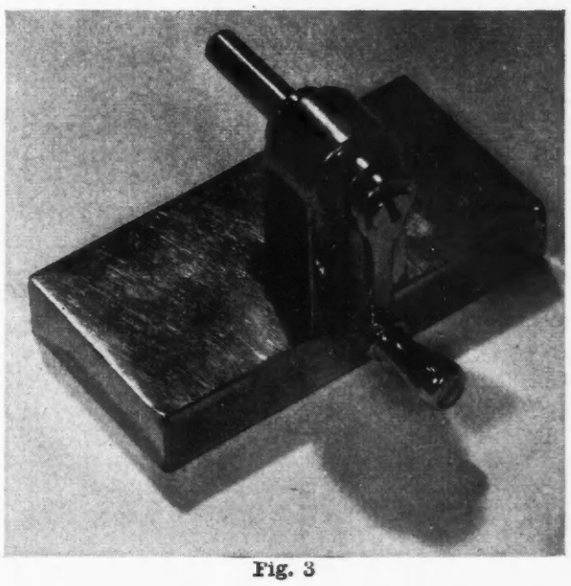


Fig. 3

The spools are wound on a simple winder with a tapered shaft (Fig. 3). They are then inserted into the holder and the device is sterilized as a unit.

This instrument has proved its value in numerous operations. We have found it superior to any similar device available.

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THE CANADIAN MEDICAL ASSOCIATION

Editorial Offices—3640 University Street, Montreal

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EDITORIAL

BLOOD ALCOHOL AND THE DOCTOR

THE technique for estimating alcohol in the blood of persons suspected of alcoholic intoxication has been so extensively studied and improved that the courts may now place confidence in the figures presented by a qualified analyst.

The drawing of blood samples from persons suspected of alcoholic intoxication must be performed by a qualified medical practitioner. As ethyl alcohol has so long been used by some of the profession to cleanse the skin, it has often been employed inadvertently as an antiseptic before drawing a sample of blood from a person suspected of alcoholic intoxication. While it is true that the careful physician allows the alcohol applied to the skin to dry before inserting the needle so that no extraneous alcohol may get into the sample, the use of alcohol, however, where the courts may be involved, leaves the degree of dryness a subject for argument. When alcohol is employed to sterilize the needle or perhaps the syringe, the problem is much more serious. This is so because one drop of alcohol in the 10 c.c. sample taken, is sufficient to produce a level of about 150 mgm. per 100 c.c. of blood, a level accepted in some parts of Europe and in some States of the United States as that producing alcoholic intoxication in the accused with respect to driving a motor car.

The following statement was made in the *Toronto Daily Star,* February 13, 1949, by Dr. William H. Avery, York County Coroner. "If alcohol is used in taking a blood test to determine intoxication, the test is useless." The public will soon be aware of the situation and in cases thrown out of court for the reason cited above, reflection may fall on the profession for lack of intelligence or for actual conniving to thwart justice. The chief coroner for Ontario has remarked that owing to the use of alcohol as an antiseptic when drawing blood for alcohol tests, a number of guilty persons have escaped justice.

The situation may be remedied easily by the use of the newer cationic detergents, such as benzalkonium chloride (zephiran chloride) U.S.P., or a non-official preparation centrimide (C.T.A.B.). These are powerful germicides in aqueous solutions. For surgical instruments zephiran chloride 1:1,000, or centrimide 1:100, is sufficient. These reagents may be employed on the skin and for emergency purposes, where boiling a syringe and needle is impossible, will adequately sterilize a syringe or needle. In the Department of Pharmacology, University of Toronto, it has been experimentally established that neither of these antiseptics distil into the potassium dichromate reagent employed in the method adopted for analysis of alcohol in blood. It has also been shown that the antiseptics, when left over night in a sample of blood containing alcohol, do not change the amount of alcohol recoverable.

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ADRENAL HORMONE TREATMENT OF RHEUMATIC DISEASE

THE Mayo Clinic workers have repeatedly emphasized the fact that so far their work in connection with the effect on rheumatic disease of the adrenal hormone cortisone is investigative only: the technical difficulties in its preparation are so great that enough for treatment or even research alone, cannot be expected before 1950 at the earliest. But the results obtained so far are certainly encouraging. Our attack on the problem of rheumatoid arthritis has always been limited by our ignorance of the etiological factors. Dr. Hench has spoken of the two aspects in all arthritis;[1] first, that in which changes occur which lead to the disease—this is the "fire"; second, the resultant pathological structural changes—the "ashes". It is these structural changes which fill the eye: we know something about them. But we know practically nothing of their initial stages. It is on these that our attention should be focussed, since it is in them that we see perhaps too seldom, the capacity of the body to reverse them, or, to follow up the simile, to put out the fire.

Jaundice, pregnancy and the adrenal cortex as stimulated by anæsthesia or surgical operations appear to influence rheumatoid arthritis. It was in the search for a common denominator for these factors that the idea of an adrenal hormone was evolved, and it is interesting that before the adrenal cortical fraction, originally termed compound E, was actually used clinically, the belief was expressed that if it was an adrenal cortical agent through which jaundice and pregnancy produced their ameliorative effect on rheumatoid arthritis, then results from the substance would be expected within a very few days. This actually occurred. Within three days of the use of cortisone in a severe case of rheumatoid arthritis relief was obtained, and in a week signs and symptoms had practically gone.

There are still certain difficulties regarding administration. So far the dosage needs to be fairly large—100 mgm. daily. Smaller multiple doses are ineffectual. No notable side effects have been noted, but in one case overdosage was apparently responsible for some endocrine disturbance. One outstanding feature is the necessity for continued administration. When it is stopped symptoms return, and the sedimentation rate rises again. So far as can be determined it appears to be a form of replacement therapy.

1. HENCH, P. S.: *Proc. Staff Meet. Mayo Clin.*, **24:** 167, 1949.
2. HENCH, P. S., KENDALL, E. C., SLOCUMB, C. H. AND POLLEY, H. F.: *Proc. Staff Meet. Mayo Clin.*, **24:** 181, 1949.
3. *Idem*: *Proc. Staff Meet. Mayo Clin.*, **24:** 277, 1949.

Did you know that you can determine whether a lobster was dead when it was boiled by bending its tail back straight and seeing whether it snaps back into place or not? At what point of said lobster's anatomy should you sniff to determine whether his tissues have become decomposed?

Did you know that you should examine the side of a mackerel, the backbone of a halibut, the eyes of a cod, to determine its degree of mortuary decomposition?

Did you realize that pressure due to forcing meat through a chopping machine too fast, or the chopping of pieces that were too large, or the piling up of meat on a counter during trimming, could produce appreciable increases in temperature, favourable to decomposition? Would you have imagined that a tactful campaign of education could reduce the average bacterial content of chopped meats in a city from 10 million to 200,000 per gram?—*American Journal of Public Health and The Nation's Health*, **37:** 1174, 1947.

EDITORIAL COMMENT

Television at the Annual Meeting

The first instance in Canada of television in medicine was at the 80th annual meeting of the Canadian Medical Association at Saskatoon. The part to be played by television as an educational method has yet to be established, but there is little doubt of the keen interest evoked by the showings at the Convention. A total of nine programs were televised from the Saskatoon City Hospital to salons in the hotel, and the attendance at these was large and sustained. A commentator gave a running summary of the course of the operations, and medical clinics were also televised. The showings were excellent

Fig. 1.—A Quebec group studies the schedule of television programs in the lobby of the convention hotel. Forming the semi-circle, from left to right: Dr. J. B. Jobin, Quebec City; Mde. P. Gilbert, Charny, Que.; Dr. L. N. Larochelle, Quebec City; Mde. J. B. Jobin; Dr. Paul Gilbert; Dr. Yvette Brissette-Larochelle.

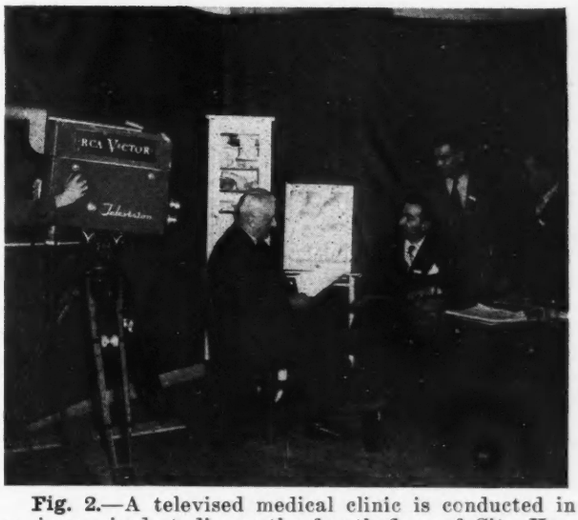

Fig. 2.—A televised medical clinic is conducted in an improvised studio on the fourth floor of City Hospital, Saskatoon. Pre-selected patients were ushered into the studio from time to time during the telecast for typical interviews, examinations, etc. This was one of three clinics held (other two: tuberculosis and cancer). The clinic is being conducted by Dr. C. C. Birchard (centre) and Dr. D. M. Baltzan.

in their clarity and natural atmosphere, and there was no question of the ability of television to bring to large and distant audiences details of operating in a way which would be otherwise impossible.

The thanks of the Association are due to Messrs. E. R. Squibb and Sons of Canada for their initiative in sponsoring these television programs.

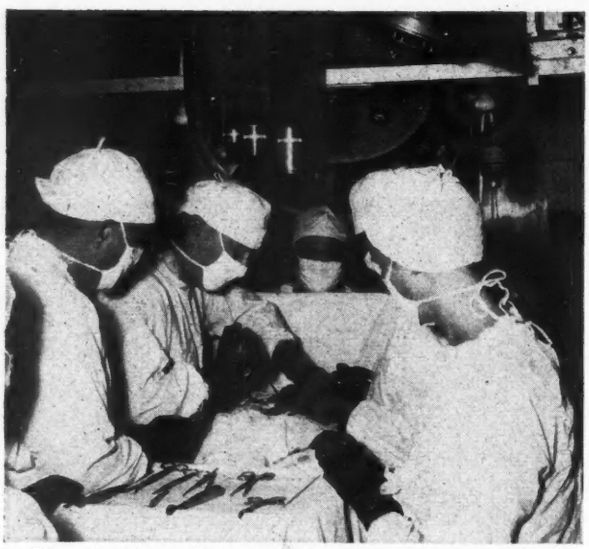

Fig. 3.—A typical operating room scene with two great differences, one visible, one not apparent. The visible difference is, of course, the television camera suspended from a special metal beam. (The camera has three lens: 50 mm., 90 mm. and 135 mm., allowing a close-up, semi-close-up or more general view of operating area). The other difference is that several hundred doctors, comfortably seated approximately one mile away, are viewing this operation and obtaining a perfect view of the surgeon's technique. In addition, they are listening to a running commentary of the surgeon's every move, delivered by a commentator selected by the operating surgeon.

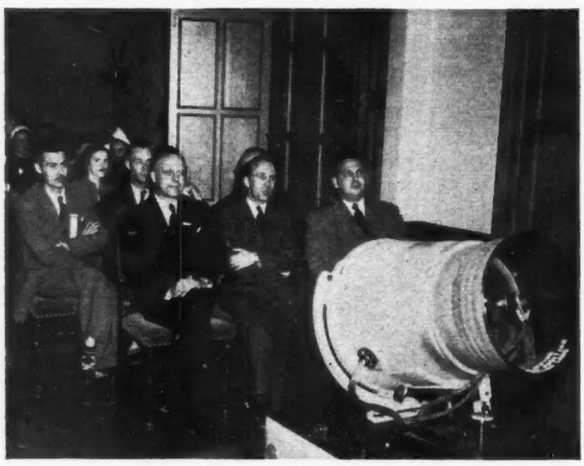

Fig. 4.—Among interested television observers in a private salon of the hotel are Premier T. C. Douglas (front row, centre) of Saskatchewan; Dr. J. F. C. Anderson, Saskatoon, C.M.A. President; and J. St.C. Moffat, an executive of the sponsoring company. About 75 people were given a perfect view of the operation in progress, due to the projection-type receiver (foreground) which permits projection of image on a six by eight foot screen.

MEN and BOOKS

THE IDEA OF SOCIAL MEDICINE IN AMERICA*

George Rosen, B.S., M.D., Ph.D., M.P.H.†

New York, N.Y.

"No man is an *Iland,* intire of it selfe; every man is a peece of the *Continent,* a part of the *maine.* . . . ."—John Donne, 1623.

I.

Recently the term social medicine has gained wide currency. The rapidity with which this has taken place is striking indeed, so that the meaning of this development is a matter of some import. Is social medicine just a new name popularized by a passing fad? Is it the expression of a fundamentally new idea unknown to the past? Or does it represent an awareness of a need for reformulation in our day of an older purpose which had been allowed to drop out of sight with the passage of time, and for the implementation of that idea in the light of the best medical knowledge of the present? Answers to these questions may be found by reviewing the origin and tracing the development of the concept of social medicine.

Only cursory investigation discloses that the term *social medicine* was first used by Jules Guérin[1] in March, 1848, and that the need for consideration of social viewpoints in dealing with problems of health and sickness had been recognized still earlier.[2] The fact is that the idea of medicine as a social science began to take form about a hundred years ago, and by the first two decades of the twentieth century this process had led in a number of European countries to the development of precise concepts capable of practical application.[3]

In America, there has not been as yet any comparable theoretical development. Interest in the formulation of a *concept* of social medicine is a comparatively recent phenomenon, and for the most part American thought on this subject is still in a state of flux. At this time, therefore, it may be of considerable benefit to our understanding of this complex problem to seek out some of the roots of the idea of social medicine in America and to examine various lines of development to the present.

II.

By the end of the eighteenth century it had been thrust upon European public opinion that

* The Eleventh Louis Gross Memorial Lecture, delivered before the Montreal Clinical Society, October 27, 1948, at the Jewish General Hospital, Montreal.

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health, social conduct, and economic efficiency were intimately related, and this awareness was summed up for practical action in the concept of *medical police*. Underlying this concept was an idea of preventable mortality, according to which "the principal general sources of disease . . . exist in external, and for the most part removable causes. . . ."[4] In keeping with the derivative character of much of their knowledge, American physicians of the early nineteenth century adapted this concept and employed it in dealing with current problems.

Among the situations that precipitated early action in the interest of the public health, epidemics occupied a prominent place. During and after 1793, recurring outbreaks of yellow fever ravaged American seaports. Governmental authorities sought medical advice on the proper measures to be taken. Confusion regarding etiology and transmission prevailed, but control was based upon two procedures, quarantine and environmental sanitation. Illustrative is the lecture "On the means of Improving the Medical Police of the City of New York" delivered in November, 1820, by David Hosack. Though a staunch contagionist and an advocate of quarantine and isolation, Hosack also recommended improvement of the municipal water supply, better housing for the poor, introduction of a sewerage system, widening of the city streets, limitation of burials within the city, and substitution of stone for wood in the construction of wharves and docks.[5]

Interest in the relation of environment to health and disease was reinforced from another direction. The appearance during the last decade of the eighteenth century of the first comprehensive medical geography[6] stimulated the production of numerous monographs on the diseases of particular regions, or medical topographies, as these were called.[7] Subjects dealt with in these monographs were physical geography and natural history of the region; food, housing and customs of the inhabitants; and the relation of these to the occurrence of endemic, epidemic and sporadic diseases. In 1830, for instance, a committee of the New York State Medical Society proposed a plan for a "Medical Topographical Survey of the State", and presented an outline to be used in such an undertaking. With respect to the inhabitants, the committee felt that "the most important circumstances to be ascertained are: The density of the population; their houses; mode of building and materials used; their arrangement in respect to air and light; the bedding, clothing, and furniture, particularly of the poorer classes; the supply of fuel and its kind; the occupation of the mass of the people". Pointing out that "The mode of living exerts an extensive influence upon the characters, as well as the kinds of prevailing diseases", the committee asserted "It is therefore desirable to know the ordinary diet of the labouring classes; the quality of the water used, and its effects upon persons not accustomed to it; the manner of bringing up children, in particular, is a matter of much interest, inasmuch as it influences the state of health throughout life". Finally, since the chief object of medical topography is "to ascertain the influence of climate, soil, different occupations, and moral and physical causes, in the production or modification of diseases", attention must be directed to the age, sex, constitution, occupation and diet of those most liable to be affected "by endemic or epidemic diseases."[8]

In broadening and deepening this interest in the relation of environment to disease, rapid urban expansion due to increasing swarms of immigrants exerted a pervasive and compelling influence. During the first three decades of the nineteenth century American cities were growing steadily if not spectacularly. In general, social conditions were favourable during this period. Such problems as poverty and pauperism were of no great importance. Up to 1840, cities like New York and Boston easily accommodated the gradual increase in residents. At the same time, however, profound changes in the political, economic and social life of various European communities were setting in motion a stream of migration that was to upset with violent impact this process of orderly adjustment. Relatively few immigrants entered the United States south of Chesapeake Bay or northeast of the Hudson, except those who landed at New Orleans or Boston. The terrific shock produced by the unexpected influx of swarms of impoverished immigrants was first felt in the larger seaboard cities, where inadequate adjustment for the increasing complexity of such problems as housing, water supply, sewage disposal and drainage soon brought into being a whole brood of evils that found their most characteristic expression in the urban slum.

Referring to New York, the physician Benjamin W. McCready wrote in 1837:[9]

> "One great source of ill-health among labourers and their families, is the confined and miserable apartments in which they are lodged. In the rapid growth of our city in particular, the number of buildings has by no means increased in a manner corresponding to the great influx of strangers. The accommodations are insufficient, and the rents in consequence extravagantly high. Upon no class of the people does this evil weigh so heavily as upon the labouring population. . . . In some instances large buildings, designed for breweries or sugar refineries have been divided into numerous small, dark rooms, every one of which is tenanted by a family. In other cases the cupidity of landlords has tempted them to build up narrow alleys with small wooden tenements, which, costing but little, and being let to numerous families, yield immense profits. The alley is often not more than six feet wide, paved with round stones and with very insufficient means for draining off the water. It is not uncommon in such situations, to find one or two of the apartments in each house entirely under

ground. Can we wonder if in such a state of things we find moral as well as physical disease, vice as well as sickness?''

With prophetic foreboding, McCready went on to say: ''In our towns, the evil is a growing one; every year adds to its magnitude, and unless something be done to check its progress, our city will ere long present examples of disease and deformity which hitherto could only be found in the over-grown towns of Europe.''

Nevertheless no remedial action was taken, and a whole generation was to elapse before any positive program was put into effect.

Before improvements could be inaugurated, it was necessary to bring to light the facts about living conditions and disease among the masses. There was need for realistic investigation of the influence of the conditions of everyday life on health. Meanwhile, broadening contacts with Europe brought knowledge of what was going forward in other parts of the world. Facing slum conditions similar to those in Great Britain and France, American investigators were greatly influenced by points of view and methods already applied in those countries. The pioneer studies of L. R. Villermé in Paris, and the striking reports of Southwood Smith and Edwin Chadwick in England, were paralleled between 1845 and 1865 by a series of equally significant inquiries in America.

Following the appearance of Chadwick's celebrated report, the National Institute at Washington tried for several years to secure a similar health survey on a national scale. Although this aim was not achieved, the Institute in 1848 did persuade the American Medical Association, which had just come into being, to investigate conditions in American cities.[10]

Preceding this co-operative effort, however, a penetrating study of the situation in New York had already been made in 1845 by Dr. John C. Griscom. In 1842 he had been City Inspector of the New York Board of Health, and to his formal report at the end of the year he appended: ''A Brief View of the Sanitary Condition of the City''. Three years later, Griscom expanded this supplement into a small book entitled *The Sanitary Condition of the Labouring Population of New York.* Chadwick's influence is clearly manifested in the title of Griscom's inquiry. Furthermore, a reference to the New York City Inspector's Report of 1842 to a paper on ''Pressure and Progress of the Causes of Mortality'' prepared by Chadwick in 1843 seems to indicate some correspondence between Griscom and the English sanitarian.

Griscom's study already contains in essence the principles and objectives that were to characterize the health movement of the next thirty years. Briefly stated, these were: first, ''that there is an immense amount of sickness, physical disability, and premature mortality, among the poorer classes''; second, ''that these are, to a large extent, unnecessary, being in a great degree removable;'' third, ''that these physical evils are productive of moral evils, of great magnitude and number, and which, if considered only in a pecuniary point of view, should arouse the government and individuals to a consideration of the best means for their relief, and prevention''; and fourth ''to suggest the means of alleviating these evils and preventing their recurrence to so great an extent''.[11]

Central to this program is the concept of preventable death. It was by exploring the associations between conditions of life and greater or lesser expectation of survival that the most notable successes in achieving reform were won. Despite the absence of knowledge concerning micro-organisms as *materies morbi,* it was possible to make an effective attack on the problem. In fact, it might even be said that this very ignorance of much of the content of modern medicine provided a favourable intellectual climate for the pursuit of studies on the relations between the living conditions and the morbidity and mortality of a given social group. Here the statistical approach, in particular the use of the life table, provided an invaluable weapon, and vital statistics assumed a new social significance.

In 1839, a small company of men meeting at No. 15 Cornhill, Boston, organized the American Statistical Association. Among the charter members was Lemuel Shattuck, school teacher and publisher, who was to play a leading rôle in pressing for the registration and reporting of vital statistics, and for the use of these data in dealing with the social problems of disease. In the history of American statistics the years from the eighteen-thirties to the 'sixties have been characterized as a period of great expectations. It was a time of humanitarian reform, and one of the prime tenets of this period was that rational change must be based on thorough knowledge, with emphasis on the importance of statistical data for purposes of social progress. This standpoint was concisely described in a review of the *Report* of 1850 issued by the Massachusetts Sanitary Commissioners under Shattuck. The author of this survey, states the reviewer, ''does not regard questions concerning census, population, immigration, births, marriages and deaths, as matters of curiosity, but as great philosophical truths, on which human elevation must be, in great measure, based, and out of which individual and social progress may be educed''.[12]

However, the full impact of the statistical approach did not actually make itself felt until after 1850. Shattuck's *Report to the Committee of the City Council appointed to obtain the Census of Boston for . . . 1845* broke new ground in pointing out the potential social usefulness of the census. His report included a considerable amount of well-digested information on all phases of the life of the people of Boston. And yet, with one exception, none of the reports on health conditions in American cities published in 1849 by the Committee on Public

Hygiene of the American Medical Association made much use of statistical evidence.

Nevertheless, from these reports with their critical discussions of the baneful nature of urban slums, it is evident that physicians were awakening to the situation. A most striking and forceful indictment of existing conditions in New Orleans appeared in 1851 from the pen of J. C. Simonds, a physician of that city.[13] Through analysis of whatever statistical data was available to him Simonds undertook to calculate the cost of illness and death to the city of New Orleans, and to show to what extent this could be reduced by improving health conditions, or in other words, to point out the cost of preventable morbidity and mortality. On the basis of his calculations, Simonds concluded that the average annual loss to the people of New Orleans as a result of disease amounted to nearly $105 per capita. Furthermore, he pointed out that the current high mortality, which was due for the most part to infectious diseases, affected chiefly the poorer classes, who constituted "not only the bulk of the population of every city, but its *most important* and *most valuable element*". As to the measures that might be undertaken to improve health conditions, Simonds said:

> "Sanitary reform, the question which is agitating other civilized communities must take place here. . . . Perhaps the most effectual means that can be adopted in the present state of things would be the formation of a voluntary health association, which would concentrate and unite the labours of those individuals whose philanthropy would induce them to engage in undertaking, first to ascertain the truth with regard to our sanitary condition; next, to inform the community upon the subject, and finally, to urge those measures that might be deemed advisable.[14]

In support of these proposals, he pointed to the English Health of Towns Association.

Clearly something concrete and immediate had to be done to mobilize the forces of the community for control of disease and improvement of health. This necessity led to the establishment between 1845 and 1875 of a number of voluntary health associations. Among these unofficial organizations may be mentioned the Quarantine and Sanitary Conventions, the New York Sanitary Association, the American Public Health Association and the American Social Science Association. In this connection, it is of interest to note that Canada was represented at the Third National and Sanitary Convention, held at New York in 1859, by two medical men, E. H. Hodder and J. F. Haswell, and that among the first members elected to the American Public Health Association in 1872 was Dr. William Marsden of Quebec.

Characteristic of these associations were the nature of their membership, and the stress laid on social action for reform. By bringing together physicians, public officials and civic-minded laymen, such organizations were able to create a broad base for the mobilization of the forces of the community. Imbued with a high moral purpose, the members of these associations regarded themselves as "enlisted in a crusade against a gigantic and growing evil".[15] From contemporary evidence it is abundantly clear that these efforts derived from certain fundamental premises. Reporting in 1865 on the sanitary condition of New York the Council of Hygiene and Public Health of the Citizens' Association of New York asserted:

> "The relation of the health and vigorous life of a people to the State, or to commercial prosperity, requires no discussion. . . . From Plato to the greatest of modern statesmen and economists, the sanitary welfare of a people has justly been deemed an essential element of social and commercial advancement; and so intimately related do we find the sanitary and the social wants of the population in the City of New York, that, from the outset of reformatory efforts, whether social and political or exclusively moral and religious, sanitary improvement is a work of paramount necessity".[16]

A very explicit formulation of this concept was given by Edward H. Janes.

> "In studying the important question of public health in its various relations," he said, "and especially as it regards communities of any particular class, we shall find that the degree of aggregation, or the dwelling of people in masses, must be recognized as a condition which bears very decided relations to the health of man as well as to the future development and sanitary interests of his offspring. There are certain general causes, such as mode of living, personal habits, and the variety of circumstances by which the individual is from time to time surrounded, which apply to all classes of persons, and which affect health either favourably or unfavourably in proportion to the varying degree of regularity with which well known hygienic laws are observed. While man must look well to the supply of his physical necessities as one of the primary conditions upon which he may expect the enjoyment of sound health, he is also largely indebted to his social surroundings for the degree of his physical perfection, as well as for the standard of his intellectual and moral excellence, each individual yielding somewhat to the stronger influences emanating from his immediate associations, being reduced to a lower grade when these associations point in that direction, either mentally, morally, or physically, or possibly elevated when the tendency of the surrounding influences is progressive and upward. These social influences exert their power, either good or bad, upon all who come within reach, and hence aggregation of population carries with it an effect like that of the pressure of fluids, tending to reduce to a common level the general mass".[17]

With this concept as a point of departure, these voluntary groups undertook to educate the people to the advantages of public and private hygiene, to press for administrative reform, and to take direct action for the elimination of crowded, poorly ventilated and filthy tenements, impure water supplies, inadequate sewerage, and unwholesome food. This program won considerable popular support and scored several major victories, chiefly in the fields of housing and administrative reform.

The New York Association for Improving the Condition of the Poor was founded in 1843 by Robert M. Hartley, who had a very enlightened conception of the need for sanitary

and decent housing. From 1846 on, this association insisted unremittingly on the need for devising measures to improve the health of the tenement population. A state legislative commission, appointed in 1856, recommended the creation of a separate tenement house department, but the legislature did not see fit to adopt this recommendation. In 1867, however, on the advice of the aforementioned Council of Hygiene, a Tenement House Law was enacted. It was to be administered by the Metropolitan Board of Health that had been created the year before. With modifications, this law was to govern the housing of the poor in New York until 1895 when a new measure was passed.

The development of permanent health administration took a somewhat similar course. A health survey of Massachusetts had been carried out by Lemuel Shattuck in 1850. On the basis of this report the establishment of a state board of health had been recommended, but not until 1869 was this proposal adopted and put into effect. Agitation for reorganization of the New York City health service had been carried on for a period of several decades before the Metropolitan Board of Health was established in 1866. A committee of the New York State Senate, appointed in 1858, had taken evidence and reported the need for administrative reorganization of the municipal health department.[18] Nevertheless, basic reform was not initiated until after the publication in 1865 of a detailed report, by the Council of Hygiene and Public Health of the Citizens' Association of New York, on the unsanitary conditions prevailing in the city. The acme of such efforts in the United States was reached with the establishment in 1879 of a National Board of Health.

Developments in Canada were similar. Health conditions in Montreal were deplorable in the 'seventies, and in 1875 a voluntary organization known as the Citizen's Public Health Association was organized. The object of the Association was "to increase and diffuse knowledge on all subjects relating to the public health, by the discussion of sanitary subjects, by the exposure of sanitary evils, and by promoting sanitary legislation".[19] Not until 1887, however, was the formation of a Board of Health for the Province of Quebec completed.[20]

It is clear that by the middle of the 'seventies considerable advance had been made in America toward a socially oriented view of health and disease. Physicians, lay sanitarians, and public administrators had come to recognize that health and disease were in considerable measure an expression of collective behaviour, that social and economic conditions were inextricably intertwined with morbidity and mortality.[21] Translation of this idea into practical consequence took the form of specific measures intended essentially to eliminate filth and improve the physical environment, especially of the poorer classes. This activity was fundamentally empirical, and hardly any effort was made to develop a comprehensive theoretical foundation for remedial action. Furthermore, governmental action was invoked only to a limited degree, and specifically social measures, despite several interesting suggestions, were limited to organized charity. For instance, in 1865, Dr. E. H. Janes, who has already been mentioned, recommended that "a system of marketing be instituted by which the consumer is brought into immediate relation with the producer; thus placing within the reach of the poor of our city good wholesome food, in place of the miserable half-wilted trash almost universally used by this class of people".[22] This proposal was ignored, however, and it was not until the depression of the nineteen-thirties that effective action along these lines was undertaken.

Catastrophe often precedes and brings into sharp focus the need for social change. In the health movement of the nineteenth century this element was provided by recurrent epidemics of various communicable diseases—cholera, yellow fever, typhoid fever, small pox and typhus fever. While it was recognized that dire poverty, inadequate housing and insanitary surroundings took their toll in sickness and lives, this knowledge was dramatically impressed upon public opinion by every invasion or outbreak of epidemic disease, and the need for remedial action became a matter of terrifying urgency. While the results achieved by the practical program of the sanitarian were statistically impressive, nevertheless ignorance of the microbial etiology of communicable disease made it impossible to bring about the disappearance of all unnecessary disease that the public had been led to expect.

It was at this juncture that the development of medical bacteriology occurred, and with it a major shift of emphasis in the program of disease prevention.[23] From the control of man's environment attention was turned to the control of specific communicable diseases. In practice the application of the knowledge of bacteriology meant a restricted health program. The 'eighties and 'nineties of the last century, when the problem of disease causation was equated with the concept of the pathogenic microorganism, may be described as a period of systole in medical thinking on the environmental, and more particularly on the social components of health and disease. By the first decade of the twentieth century, however, this systole was being followed by a diastole. Poverty and privation, which revealed the destructive rôle of ill health, could not be ignored, and the need for vigorous social action against physical and mental illness was obvious.

Again, leadership in attacking these questions was assumed not by government but by voluntary agencies. Historically, the new voluntary health movement appears to have had two main

sources of inspiration. On the one hand, the voluntary agencies arose and based their efforts on concepts of health and disease that had been developed and had gained acceptance at the end of the last century and the early years of the present century. Important in this respect was the concept of the etiological specificity of disease, as exemplified by bacteriology. Almost equally important was the trend to specialization in medicine which was accelerated by the new discoveries. On the other hand, the health agencies developed out of the efforts of organizations to grapple with the social problems created by the industrial revolution in America. The social and economic environment within which this development took place is that of American industrialization with its accompanying urbanization and immigration. When America laid aside its arms after Appomatox and turned back to the pursuits of peace, it stood on the threshold of an unparalleled industrial expansion and its future lay in the hands of the machine. It was the rapid economic expansion of the country which helped to create the problems that give rise to the voluntary health agencies, and which made available material resources and leisure that could be utilized to create new organizations of public and social significance.

This was a period of extraordinary ferment and change, a period best characterized for our purpose in terms of industrial violence at Homestead, Andrew Carnegie's pronouncement of "Triumphant Democracy", and the founding of Hull-House in 1889, three years after the Haymarket riot and the execution of the Chicago anarchists. Nevertheless it was also a period of confidence and optimism, a period of faith in human nature, of belief in a steady progress of mankind, and confidence in what might be accomplished by conscious social action.[24] Ideologically, the orientation of this movement was empirical and pragmatic. It had no well-articulated system of ideas which could be accepted in its entirety by all those who participated, and into which such diverse problems as poverty and dependency, infant mortality, sweatshops, prostitution, tuberculosis prevention, and tenement house reform could be fitted. This has been clearly expressed by Edward T. Devine, a pioneer of the movement.

> "Emerging social work in America in the nineties," he wrote, "was neither reactionary nor Utopian. Both liberal progressives and social-minded conservatives had part in it. Its embryonic philosophy was so formulated as not to exclude any who were willing to face the facts and to co-operate for the eradication of demonstrable evils, for the realization of demonstrable possibilities for a happier and better life, for the essentials of rational human existence for all."[25]

It was clear, however, that ill health was "the most constant of the attendants of poverty". In the homes of the poor, Devine said, "we find the dire consequences of death and disease, of unemployment and underemployment, of overwork and nervous strain, of dark and ill-ventilated and overcrowded rooms, of undernourishment and exposure and poisoned food, of ignorance and maladjustment."[26]

It was in terms of these ideas that physicians, social workers and other socially-minded citizens found a common ground for action, in the prevention of tuberculosis, to obtain decent working conditions in factories, better housing and the like. This is clearly evident from the statement of objectives presented in 1902 by the Committee for the Prevention of Tuberculosis of the Charity Organization Society of New York. These purposes were:

> "1. Research into the social, as distinct from the medical aspects of tuberculosis. For example, into the relations between the disease and overcrowding, infected tenements, and unhealthy occupations, and also into the influence upon recovery of improved diet and hygienic living.
>
> "2. Education. The publication of leaflets and pamphlets, the giving of lectures, and the promulgation in every possible way of the fact that tuberculosis is a communicable and preventable disease. . . .
>
> "3. The encouragement of movements for suitable public and private sanatoria, both for advanced and for incipient cases; for adults and for children; for free care and also for the care of those who can pay moderate fees.
>
> "4. The relief of indigent consumptives by the provision of suitable food and medicine, by the payment of rent when this is necessary to secure adequate light and air, and by transportation and maintenance at a distance, when . . . this is essential."[27]

Combining the technical knowledge of specialists with an acute awareness of the social aspects of ill-health, other voluntary health agencies undertook aggressive attacks upon such problems as infant mortality, mental hygiene, venereal disease, loss of vision or hearing and others. The courageous pioneering of these groups has done much to advance health legislation, and to provide new health services until such time as governmental agencies have been prepared to assume them. Nevertheless, their unco-ordinated attacks on specific diseases did little to advance a comprehensive formulation of the environmental, and more particularly of the social relations of health and disease.

It was inevitable that the transformation of the United States from a rural agricultural nation to one predominantly urban and industrial should have a profound effect upon its civil institutions. The resulting expansion of governmental functions was already evident during the latter part of the nineteenth century, but the full impact of public undertaking in relation to health was not felt until well into the twentieth century. The decade between 1910 and 1920 marked the first great period in the formulation of American social policy and of legislation in relation to health. The keynote for the period was struck by Hermann Biggs in 1911.

> "Disease is largely a removable evil," he wrote. "It continues to afflict humanity, not only because of incomplete knowledge of its causes and lack of adequate individual and public hygiene, but also because it is extensively fostered by harsh economic and industrial

conditions and by wretched housing in congested communities. These conditions and consequently the diseases which spring from them can be removed by better social organization. No duty of society, acting through its governmental agencies, is paramount to this obligation to attack the removable causes of disease. . . . The reduction of the death rate is the principal statistical expression and index of human and social progress. It means the saving and lengthening of the lives of thousands of citizens, the extension of the vigorous working period well into the old age, and the prevention of inefficiency, misery and suffering. These advances can be made by organized social effort.''[28]

Numerous studies demonstrated the toll levied by sickness upon society. Illustrative are the valuable report on *National Vitality, Its Wastes and Conservation* prepared in 1909 by Irving Fisher, the sickness surveys carried out by the Metropolitan Life Insurance Company from 1915 to 1917, and the reports of various state commissions on social and health insurance that were appointed between 1915 and 1920. To meet the exigencies of industrial expansion and the challenge of economic insecurity, workmen's compensation schemes were inaugurated, and legislation was passed for the protection of women and children.[29] As a natural and logical sequence to the great success of the campaign for workmen's compensation, the first extensive movement for a comprehensive system of compulsory sickness insurance in the United States appeared in 1916. Despite vigorous agitation, this insurance project failed and the movement was completely silenced for several years. It was at this time also that the first discussions of sickness insurance appeared in Canada.[30] During the period between World War I and the depression of the 'thirties all public interest in this subject seems to have disappeared. It was not until the decade of the 'thirties that a resurgent movement for the better provision of medical care made its appearance. The crisis of 1929 and the depression that followed again brought into sharp focus the relations between health and environment. In this connection valuable studies were carried on by the Committee on the Costs of Medical Care (1927-1932), the National Health Survey (1935-1936) and by the Cost of Living Division of the U.S. Department of Labour (1936).

III.

From the foregoing it is clear that in the course of the past century there has been developing in America a realization that health and environment in the broadest sense are inextricably linked. Over the years this realization has found practical expression in two distinct forms. One of these was concerned with the control and regulation of the physical environment, for example, sanitation, water supply and the like. This was the beginning of modern public health administration. The other was concerned with the prevention or amelioration of the social and economic maladjustments of the urban worker and his family, and with improvement of the standard of living. This intelligent humanitarianism became organized social work. Moreover, throughout this period and as a result of this practical work, there have accumulated masses of data on environmental changes and health. Yet no concerted effort has been made heretofore to organize such knowledge on a coherent basis, and to develop a systematic theory of social medicine.

In 1925, Francis Lee Dunham made an abortive attempt to develop a concept of social medicine. Edgar Sydenstricker, in 1933, carried out a masterly analysis of the idea of environment, and showed how each of the component aspects was related to health problems. He thus laid a basis for a theory of social medicine, but never carried it to its logical conclusion.[31]

Social medicine in America is still an idea, it is still in a state of ''becoming''. Facts and issues concerning the social and economic relations of health have won increasing attention during the last twenty years. Yet the conception of environment, especially in its social aspects, as a creative influence in determining health is a vital idea still not adequately explored. Last year, the New York Academy of Medicine held a three-day institute on social medicine. At one of the sessions, Dr. George Baehr, president of the Academy, said that ''social medicine as yet is everybody's business but nobody's responsibility''. He expressed the hope that the institute would ''focus attention upon the urgent need for a more systematic coordination of our efforts to investigate the social factors responsible for disease'' and ultimately to correct them. One must agree that a basic need of social medicine has been and will be more knowledge. The seeking of that knowledge is the primary aim of research in social medicine. But in seeking for new facts it would be fatal to lose sight of their relation to the total problem of health with its manifold medical and social ramifications and interconnections. What is needed today is a synthesis which will select from clinical medicine, public health, individual and social psychology, sociology and economics the established data on health and social environment and co-ordinate these so as to bring about the development of a concept of social medicine. One hundred years is not a long time as history goes, but in the history of social medicine in America it has been a period of birth, growth and development to a point where the idea of social medicine is able to take form as a distinctive body of knowledge concerned with the relations of man to his environment, and the effect of these on his health, and is ready to assume responsibility for the application of this knowledge in prevention, diagnosis and treatment of ill health.

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MEDICAL SOCIETIES

The Society of Obstetricians and Gynæcologists of Canada

The annual meeting of the Society of Obstetricians and Gynæcologists of Canada was held at Jasper Park Lodge, Jasper, Alberta, June 18 to 21, 1949. There were twelve papers presented, two of which were given by the guest speaker, Dr. John L. McKelvey, Professor of Obstetrics and Gynæcology at the University of Minnesota. The titles of his papers were, "Irregular Shedding of the Endometrium", and "Arteriosclerotic Toxæmias".

The officers elected for 1949-50 are as follows: President—Dr. H. B. Atlee; Past-president—Dr. J. Ross Vant; President-elect—Dr. N. W. Philpott; Vice-president—Dr. F. Gagnon; Secretary—Dr. K. M. Grant; Treasurer—Dr. F. L. Johnson, Hamilton; Members of Council—Drs. A. C. Gardiner Frost and D. N. Henderson.

It is proposed to hold the next annual meeting in the Maritimes in June.

La société médicale des hôpitaux universitaires de Québec

Vendredi, le 18 février, 1949.

Ethmoidite et méningite. — O. Frenette et J.-R. Vaillancourt.

Nous avons présenté un cas d'ethmoidite aigüe, ayant causé comme complications locales une infection du sac lacrymal et une lymphangite régionale. Après disparition presque complète des symptômes (la céphalée seule persistant), le malade développe une méningite. Nous avons voulu particulièrement attirer l'attention sur les infections très fréquentes du sinus ethmoidal, lesquelles sont méconnues ou négligées.

Myélome multiple.—H. Nadeau et P. Maheux.

Les auteurs présentent l'observation d'une cas de myélome multiple. Le malade est porteur de lésions mitro-aortiques qui font penser au diagnostic d'endocardite maligne à évolution lente. Les modifications de la formule blanche que comporte un grand nombre de formes jeunes de leucocytes, dirigent les recherches du côté des organes hématopoiétiques, en l'espèce la mœlle osseuse. L'examen radiologique permet de déceler des lésions osseuses caractéristiques: multiples vacuoles, de quelques millimètres de diamètre, taillées à l'emporte-pièce, à rebords nets, sans processus d'ostéoplastie, disséminées dans les os du squelette: sternum, côtes, colonne vertébrale, celle-ci prend l'aspect de plati-spondylie dans la région dorso-lombaire. Il existe une fracture par écrasement de la troisième vertèbre cervicale. L'examen histologique de la mœlle osseuse obtenue par biopsie confirme le diagnostic de myélome multiple, en l'espèce un sarcome myéloblastique ou myéloblastome.

A cette occasion les auteurs insistent sur les difficultés diagnostiques que présente une telle affection. Le myélome multiple a été pendant longtemps du domaine des anatomo-pathologistes; l'absence de signes cliniques caractéristiques le fait souvent confondre avec d'autres maladies des os plus fréquentes et mieux connues. Ils insistent en plus sur l'importance des examens radiologiques et biopsiques au cours des maladies des organes hématopoiétiques. Ils signalent l'importance d'une collaboration étroite entre les différentes disciplines médicales dans la solution des nombreux problèmes qui se présentent chaque jour dans la clinique médicale.

CANADIAN ARMED FORCES

News of the Medical Services

Surgeon Lieutenant Commanders J. W. Rogers and F. C. Jones, R.C.N., have commenced courses of a year's duration at the Sick Children's Hospital and the Psychiatric Hospital in Toronto, respectively.

Major F. C. R. Chalke, R.C.A.M.C., Army Headquarters, Ottawa, recently commenced a year's postgraduate course in psychiatry at the Menninger Clinic, Topeka, Kansas.

Major J. R. Feindel, R.C.A.M.C., previously medical officer in charge of troops at Fredericton, N.B., has been appointed Area Medical Officer, Newfoundland Area, at St. John's, where he will have charge of medical arrangements for the Army in the new province.

Lieut.-Col. E. J. Young, M.D., D.P.H., Assistant Medical Director in charge of Hygiene at Army Headquarters, Ottawa, attended the annual meeting of the Canadian Health Association at Halifax, N.S., June 28 to 30, 1949. addressing the Epidemiological Section on "Military Hygiene Problems in the Arctic and Sub-Arctic".

Brigadier W. L. Coke, O.B.E., Director General of Medical Services, Canadian Army, recently completed a 6 weeks' inspection tour of Active and Reserve medical units in Central, Prairie and Western Commands, comprising Ontario, the Western provinces and Yukon Territory. Following the practice of the past two years, he was accompanied by the U.S. Medical Liaison Officer, Lieut.-Col. S. W. Cavender, U.S.M.C., throughout the whole of the itinerary.

Colonel J. N. Crawford, M.B.E., E.D., R.C.A.M.C., who attended the Diplomatic Conference, beginning in Geneva in April, for the purpose of considering the Conventions for the relief of war victims (Red Cross Conventions), returned to Army Headquarters on July 13, 1949. Colonel Crawford was the Canadian Delegate on the first Commission of this Conference. This Commission studied the Geneva Conventions for the relief of Sick and Wounded in Armed Forces in the field and the Convention for the adaptation of the principles of the Geneva Convention to Maritime Warfare. The Commission had completed its work prior to Colonel Crawford's departure from Geneva, but the final texts of the Conventions will not be submitted for signature by governments before August 1, 1949.

The Institute of Aviation Medicine, R.C.A.F., will be displaying a scientific exhibit relating to aviation medicine at the Twentieth Annual Meeting of the Aero Medical Association being held in New York City, August 29, to September 1, 1949. In addition, three papers will be given by R.C.A.F. representatives. The Canadian delegates attending will include as well representatives of the Medical Director General, Navy, and the Director General of Medical Services, Army.

CORRESPONDENCE

To the Editor:

As an ex-host to the Entamœba histolytica (*E.h.*) I was very interested to read "Amœbiasis in Veterans" (*Canad. M. A. J.*, **61**: 13, 1949). The authors are to be complimented upon a valuable piece of clinical research, the more so since they stress the very points which much sweat, blood and mucus of World War II have brought to light. Too often in the past these lessons have had to be re-learned almost *ab initio*, for the findings of one campaign have not always been unearthed for the benefit of those condemned to suffer in a following one.

Several such points are: (1) Emetine hydrochloride alone does not cure *E.h.* dysentery. (2) It does cure many metastatic complications, *e.g.*, hepatitis. (3) Psychoneurosis ("tropical neurasthenia") and "irritable colon" can be carrier states, pure and simple. (4) Combined treatment (*vide* Table III) is imperative if a lasting cure of amœbic colitis is to be obtained.

One was disappointed to find Rogers' name not mentioned before the sentence "In 1913—knowledge of this infection was virtually as complete as it is today." Rogers himself (1912) introduced the alkaloid emetine and proved its specificity—the compound of magic effect obtained from the ipecacuanha known to East Indian adventurers and used by them with benefit in the chronic flux.

Regarding salines, thrice mentioned in this article, a word of condemnation may be in order. In the tropics the quickest and the most accurate diagnostic method is to bring the patient to the microscope. By this, one means the obtaining of mucus, preferably from a mucosal ulcer and transferring it directly to the warm stage. One has personal knowledge of many cases, the outstanding one having had 20 negative stools in various units down the chain of evacuation, yet upon direct transfer, the very first specimen was teeming with *E.h.* In an hyperendemic area even a short proctoscope may be of great use. After a saline purge the adult *E.h.* may be harder than ever to find. They don't like saline. They tend to become non-motile, spheroidal, and it is alleged precystic. They are then indistinguishable from macrophages and from other vegetable and cellular elements. As a test of cure one would suggest that the use of a routine saline purge be abandoned as fogging the issue. Just as no one would treat tonsillitis or otitis without examination of the affected membrane, so should the mucosa be inspected insofar as it is available when the dysenteries are being "organized".

Table II and its accompanying literature appear rather obscure. Admittedly the adult motile phase of the *E.h.* is one thing, and that diagnostic. But in discussing the precystic phase and the cysts themselves the ground should be at once yielded to the first rate expert tropical microscopist. In the hands of the average doctor, or pathologist, a diagnosis made without seeing the red-cell containing motile, adult *E.h.* can be a snare and the patient suffers accordingly.

Finally, Drs. Ross and Dickson are to be congratulated upon showing evidence of active colonic disease in 18/23 amœbic hepatitis cases—very high scoring. One would like more evidence for the statement that the liver disease was chronic "in most cases",—or do they refer to the gut being "chronic"? In the illustration showing a classical case of acute *E.h.* hepatitis the more congratulations are in order since typical vegetative forms were found in the stool, often a matter of difficulty. Had the white blood cells shown a low polymorphonuclear differential, say around 65%, the diagnosis could have been made earlier, since this is a fact of great value, and one not mentioned on the chart (Fig. 1). Amœbic hepatitis is usually an acute condition as seen in the wards and one would surmise that all of the 23 cases of hepatitis in this series were not really amœbic. Since only 15 of these 23 responded satisfactorily to emetine hydrochloride by the same token it is suggested that the remaining 8 cases were due to some other cause.

J. A. M. CAMERON, F.R.C.S.[C.& Edin.],
Lieut.-Col., Indian Medical Service, Rtd.
2 Medarts, Calgary.

To the Editor:

First I want to excuse me for writing to you. I'm a young German doctor and I would like to get a writing connection with a Canadian doctor. I for my part, am very interested in the Canadian life and especially in the progress of science too. So it would mean so much for me to be acquainted with a Canadian doctor in order to exchange thoughts and experiences in our profession. Perhaps it will be possible to exchange medical journals too. In the last months

I worked on the Bacteriology Institute of the University of Warburg and I'm very interested in bacteriology. Because there is no occasion for me to get acquainted with anybody in Canada I'm asking you for your help. Perhaps there will be a Canadian doctor, who likes to correspondence with me. Thanking for your kindness.

DR. KLINNER

Dr. Med. Werner Klinner,
Warburg Hahn,
Am Schnitzinplastz 5.

SPECIAL CORRESPONDENCE

The London Letter

(From our own correspondent)

DISTRIBUTION OF DOCTORS

One of the duties of the medical practices committee set up under the National Health Act is to make a survey of the country and decide which areas are adequately doctored. Such areas are to be known as "closed areas", and the committee has the power to refuse an application by a practitioner to enter such an area for the purpose of public practice. The committee has now completed its survey and has divided the executive council areas into four groups set out as schedules. The two important schedules are schedules 1 and 4. The former contains a long list of areas where more doctors are needed; this contains all of the large cities in the country. Schedule 4 gives the names of the "closed areas"; these are mainly rural areas, but include three county boroughs. The ban on new doctors in these areas is not absolute. All that is intended is that applications for additional practitioners should only be considered under very special circumstances. Retiring practitioners may be replaced, but such replacement would not necessarily be automatically approved. Doctors themselves are the first to agree that some such redistribution of medical manpower is necessary, and there is no reason to fear any trouble in such a process provided adequate care is given to the consideration of individual cases and local circumstances.

CONGRESSES

This is the season of congresses, and London had three last month. The first was the twelfth British Congress of Obstetrics and Gynæcology which met under the presidency of Sir Eardley Holland. The attendance was a record one—over 700 delegates registered, of whom 100 came from overseas. The international atmosphere of the congress was well brought out at the most interesting session of all, that on carcinoma of the uterus, at which the three outstanding papers were those of Dr. Brunschwig of New York, Dr. Joe Meigs of Boston and Professor J. Heyman of Stockholm. The second Commonwealth and Empire Health and Tuberculosis Conference, organized by the National Association for the Prevention of Tuberculosis, was attended by 1,200 delegates, of whom 160 came from overseas. Medically the most important paper was that of Dr. Geoffrey Marshall on streptomycin, presenting a somewhat pessimistic picture of the status of this antibiotic. The third congress was the fourth International Congress of Otolaryngology, the first to be held since the war. Here over 1,300 delegates from forty nations met under the presidency of Mr. V. E. Negus. Of the value of such international congresses there can be no doubt, and it is therefore disturbing to learn that the delegates from at least one nation behind the iron curtain had to cancel their registrations for one of these congresses because of the difficulties being imposed upon their leaving their country.

COLLEGE PRESIDENTS

The eight years during which Lord Webb-Johnson has occupied the presidential chair of the Royal College of Surgeons, an office from which he has just resigned, constitute one of the memorable periods in the history of the College. To guide the destinies of the College during the war years was a difficult enough task, but Lord Webb-Johnson was not satisfied with mere maintenance. He foresaw the developments which must follow the end of hostilities, and with outstanding skill and assiduity he laid the foundations for a scheme of development which has already given the College a pre-eminent position in postgraduate education, not only on a national, but also on an international, scale. The benefactions which he has acquired for the College have well earned for him the affectionate title so long borne by Lord Knutsford of the London Hospital—"a Prince of beggars". While the Surgeon's College has been setting an example in keeping pace with the times, the youngest of the Royal Colleges, that of the Obstetricians and Gynæcologists, has been creating a precedent by being the first to elect a woman as its president. The announcement that Professor Hilda Lloyd of Birmingham has been elected president in succession to Sir William Gilliatt has given great pleasure to all her many friends in this country and abroad.

POLIOMYELITIS

Anxiety is being expressed at the steadily rising weekly figures for poliomyelitis. The weekly figures for the five weeks ending July 16 are 35, 48, 80, 73, 112. In numbers this is unpleasantly reminiscent of the position in 1947 when this country had its severest epidemic, but it differs in distribution. This year the attack rate has so far been highest in small and isolated areas, whereas in 1947 it was the more densely populated areas of central England that were involved. Prognostication is always difficult in a disease of unknown etiology like poliomyelitis, and while the authorities are justified in preparing for an outbreak on the scale of 1947, it is still possible that the curve of notifications may flatten out.

WILLIAM A. R. THOMSON

London, August, 1949.

ABSTRACTS FROM CURRENT LITERATURE

Medicine

Retinal and Vascular Damage in Long-Standing Diabetes. Croom, J. H. and Scott, G. I.: *The Lancet*, **257**: 6553, 1949.

The authors examined a series of 60 patients who have had diabetes from 15 to 26 years. Vascular and retinal complications are not inevitable even as late as 26 years after the onset of diabetes. Clinical evidence of diabetic intercapillary glomerulosclerosis, as shown by the development of the nephrotic syndrome, was found in only two cases. Diabetic retinopathy was observed in some cases without signs of hypertension or of generalized arteriosclerosis.

Exudates, white and well-defined, tend to be aggregated nearer the macula than the hæmorrhages. Microaneurysms are most numerous temporal to the optic disc. Isolated aneurysms were seen in the nasal half of the retina and could be distinguished from the minute hæmorrhages by their definition and the fact that they were venous in colour. Arteriosclerotic changes in the retinal vessels were either absent or minimal in most of the cases with retinopathy, 9 of the 18 patients with retinopathy had normal retinal arteries. It seems that some factor other than arteriosclerotic change must be mainly responsible for the production of retinopathy in diabetes. There did not

appear to be any correlation between the vascular or retinal changes and the severity or control of the diabetic state. LILLIAN A. CHASE

Involvement of the Ileum in Chronic Ulcerative Colitis. McCready, F. J., Bargen, J. A., Dockerty, M. B. and Waugh, J. M.: *New England J. Med.*, **240:** 119, 1949.

In 81 autopsy and 22 surgical specimens of the bowel obtained from cases of chronic ulcerative colitis 23 of the former and 6 of the latter showed involvement of the ileum (28%). The incidence of ileal involvement reported in the literature varies from 1.3 to 39%. The nature of the disease in the ileum is similar to that in the colon and may arise early rather than late in the course of the illness. It is probably an important factor in retarding healing in the colon and it is important to know of its presence if surgery is contemplated. A poor operative result will follow an ileostomy done through a segment of diseased ileum. In five of the 29 cases of ileal ulceration in this series perforation with generalized peritonitis occurred, four of them being in the immediate postoperative period. Ulceration of the ileum was demonstrated by barium-enema studies in 10 of 19 cases. Involvement of the ileum probably accounts for the high mortality in the surgery of ulcerative colitis.

NORMAN S. SKINNER

Periarteritis Nodosa — Possible Relation to the Increased use of Sulfonamides. Gelfond, M. D. and Aronoff, S.: *Ann. Int. Med.*, **30:** 919, 1949.

Many authors have subscribed to the theory, first propounded by Gruber in 1923, that hypersensitivity is an allergic factor in the production of periarteritis nodosa. Rich has recently reported vascular lesions characteristic of the disease in the viscera of 5 patients who shortly before death had hypersensitive reactions following therapeutic use of foreign serum and sulfonamides, and in one patient who had received sulfathiazole prophylactically to prevent aspiration pneumonia. Schönholzer and David demonstrated in 1942 that sulfonamides can attach themselves to plasma protein and that the complex so formed can act as an antigen, and many other observers have since described vascular changes resembling periarteritis nodosa following the use of sulfonamides. Consideration of these facts led the authors to review the case records of Bellevue Hospital from 1916 to 1946, and these have revealed that only 4 cases were diagnosed ante-mortem in the 21 years up to 1937, whereas in the succeeding 9 years 14 cases were detected clinically and proved either by biopsy or necropsy. It is to be noted that in 3 of the group of 14 cases a positive precipitin test for trichinosis was found in dilutions of over 1:1,000. In view of the greatly increased number of cases in the 9 years following introduction of sulfonamide therapy in Bellevue, the authors consider that evidence of a possible relation between periarteritis nodosa and sulfonamides is furnished. D. E. H. CLEVELAND

Dermatology

Reaction of Psoriasis Following the Use of Gamma Globulin. Klinck, G. H., Jr.: *J. Invest. Dermat.*, **12:** 261, 1949.

The history of the complete disappearance, in an inveterate case, of all psoriatic lesions for 16 months, following a severe attack of measles, suggested the therapeutic trial of gamma globulin. Six cases were treated with intramuscular doses varying from 5 to 16 ml. Results were variable but in most cases improvement occurred, although recurrence after a few months in 5 of the 6 cases treated took place. In the 6th patient lack of response might be considered attributable to his bulk, his weight being 230 lb., while the 5 others average 160 lb. The author considered response sufficiently encouraging, while recognizing the erratic course and inexplicable remissions which characterize the disease, to warrant the submission of this method for trial and evaluation by other observers. D. E. H. CLEVELAND

Further Studies on the Treatment of Lupus Erythematosus with Sodium Para-aminobenzoate. Zarafonetis, C. J. D., Grekin, R. H. and Curtis, A. C.: *J. Invest. Dermat.*, **11:** 539, 1948.

Since lupus erythematosus is a disease of unknown etiology, treatment is of necessity on an empirical basis. With the knowledge however that ultraviolet light may induce a relapse or exacerbation of the disease, while sensitivity to ultraviolet is also encountered in patients receiving sulfonamides, and that para-aminobenzoic acid and sulfonamides are metabolic antagonists it was reasoned that para-aminobenzoic acid, already in use in treating patients with rickettsial diseases without harmful results, might be beneficial in lupus erythematosus. Dosages of 2.0 to 4.0 gm. of the sodium salt were given every 2 or 3 hours "around the clock".

The cases divided into 4 groups: (1) fixed or discoid; (2) chronic disseminated without evidence of systemic involvement; (3) subacute disseminated and (4) acute disseminated lupus erythematosus. Of 6 cases in Group 1 there was more or less improvement in 4 cases, but in one of these treatment had to be discontinued because of the development of drug fever and rash. Of 6 cases in Group 2 response to therapy was good while the drug was being taken but relapses occurred on discontinuance and in one case treatment was discontinued because of drug fever. Five cases in Group 3 were treated and in one a very satisfactory response was obtained. Of the remaining 4 cases there was improvement of cutaneous and systemic manifestations during each course of the drug, and one, although apparently responding well when an acute and fatal toxic hepatitis occurred which was ascribed to an idiosyncrasy to the sodium para-aminobenzoate.

One case of acute disseminated lupus erythematosus was treated, but the drug was tolerated for one week only when it was discontinued because of nausea and vomiting and mounting fever. The course was rapidly fatal.

Œdema occurs occasionally in patients receiving the sodium salt, but the potassium salt may be substituted and is apparently of equal therapeutic efficacy. The glycosuria which occurs when more than 18 gm. daily of the medication is received appears to be on a renal basis and is of little consequence if the dietary intake is normal. D. E. H. CLEVELAND

Pathology

Diet and Cirrhosis of the Liver. Wahi, P. N.: *Arch. Path.*, **47:** 119, 1949.

This is an experimental study of the effect of high carbohydrate, low protein and low fat diet on the livers of rats. The experimental report is preceded by an extensive review of the literature on this most active subject. In the collation of the facts from the literature the author points out that the previous work has been directed to an analysis of the factors determining the occurrence of necrosis and cirrhosis of the liver in experimental animals fed protein-poor and high or moderately high fat diets. In these studies it has become apparent that many dietary factors can produce pathological effects on the liver. A deficiency of the methyl group contained in methionine and probably supplied by it for the manufacture of choline can produce cirrhosis of the liver approximately of the Laennec type. This deficiency of methyl group may be produced by a deficiency of either choline or methionine, which may be only a relative one in the presence of high fat diet. It has also been demonstrated that deficiency of the sulphhydryl

group is of importance in the development of massive hepatic necrosis in experimental animals. This group is contained in the sulphamino acids, methionine and cystine. The conditions of experimental hepatic necrosis and cirrhosis following fatty infiltration of the liver are interrelated through the lipotropic activity of methionine and the alipotropic activity of cystine and their effects have only been separated from one another by the most careful construction of artificial and synthetic diets for the experimental animals.

The author is primarily interested in the occurrence of liver disease in East Indians, and points out that the result of feeding experimental animals with synthetic diets is difficult to relate to the actual diets prevalent in humans in India. He has thus fed groups of young and old rats a diet composed of maize starch as its principal constituent with low protein content (7% yeast or 3% casein) supplemented with vitamins, fats and salt. The fat was derived from a 5% lard content. This approximates the diet of vegetarian Hindus and the poor in India. He found that young rats were more susceptible to liver injury than older rats. In the young group the animals survived 40 to 70 days and showed necrosis of the parenchyma. Most of the animals did not live long enough to show post-necrotic scarring. In older animals fatty livers developed in a large percentage and resulted in definite increase in the reticular tissue of the liver, though microscopically visible cirrhosis was exceptional. However, it was felt that if they had lived longer, they would have developed cirrhosis. The experiments do not contribute anything new to the fundamental understanding of hepatic injury in experimental animals, but they do demonstrate that hepatic injury can be induced by a diet approximating the diet in a population of human beings. Thus, the high incidence of hepatic cirrhosis in Indians can be said to be a result, at least in part, of dietary deficiency. The author discusses the apparent greater susceptibility of young animals and young humans to the disease as seen in India and relates it to the co-existence of possible precipitating infective factors. On the whole, this article is well worth reading by those interested in the latest information in the field of experimental and human hepatic disease. Some aspects of dietary therapy of human disease are also reviewed.

S. D. KOBERNICK

Effect of Choline in the Prevention of Experimental Aortic Atherosclerosis. Steiner, A.: *Arch. Path.*, **45:** 327, 1948.

Twenty-five male chinchilla rabbits (Group 1) received a normal diet supplemented by one gram of cholesterol three times weekly for each animal. A group of 29 rabbits (Group 2) received a similar diet but supplemented by choline hydrochloride in addition to the cholesterol. Of the latter animals, 18 were fed 500 mgm. of choline hydrochloride daily, while the remaining 11 received one gram daily. Cholesterol blood levels were determined at bi-weekly intervals. Animals of both groups were killed at periods from 40 to 100 days after the beginning of the experiment. The extent of aortic atherosclerosis and fatty change in the liver was noted and graded.

It was found that all animals in Group 1, except three, developed marked hypercholesterolæmia by the second week and showed marked aortic and hepatic lesions. These were already apparent on the 45th day and became very marked by the 70th day. The three animals which failed to develop hypercholesterolæmia showed no changes in the aorta or liver after 100 days. The choline-fed animals (Group 2) developed a similar degree of hypercholesterolæmia. The aortic and hepatic lesions, however, were greatly reduced in severity and delayed in appearance. No aortic lesions appeared until the 80th day. The animals which had received one gram of choline daily showed a more marked delay in the development of aortic atherosclerosis than those which had received 500 mgm. The author concluded that choline exhibited a protective action against the development of atherosclerosis in the cholesterol-fed rabbit and that this effect might be similar to the known protective effect of choline in the prevention of fatty livers in depancreatized dogs and rats.

F. A. JAFFÉ

Viral versus Toxic Hepatic Necrosis. Popper, H. and Franklin, M.: *Arch. Path.*, **46:** 338, 1948.

This paper is a morphological study of the livers from cases of fatal acute hepatic necrosis among civilians and military personnel. Only those cases were studied in which there was jaundice and in which death was considered due to hepatic insufficiency that was not a complication of another disease process. Ninety-five civilian cases, autopsied between 1929 and 1947, and 18 cases among military personnel of World War II were studied.

On the basis of the previously described lesions of the liver in "infectious hepatitis" which has been demonstrated to be due to a virus, the authors divide their cases into those which fall into this group and those which do not. The first group they call "viral" and the second "toxic" since in several of these cases known hepatotoxic agents could be incriminated. Of the 18 military cases 15 were classified viral and 3 toxic. Twenty-six of the 95 civilian cases were considered viral and 69 toxic. The toxic cases showed definite zonal necrosis such as may be caused by known hepatotoxic agents. It is the reviewer's opinion that, apart from showing that about 25% of the cases of fatal acute hepatic necrosis in civilians in this study probably belong to the group of infectious hepatitis, little is added to the understanding of either infectious hepatitis or the liver necrosis due to the variety of so-called hepatotoxic substances.

TORRENCE P. B. PAYNE

Surgery

The Nature of Postoperative Hypoproteinæmia in Patients with Gastro-intestinal Cancer. Ariel, I. M.: *Surg. Gyn. & Obst.*, **88:** 185, 1949.

One hundred patients with cancer of the gastro-intestinal tract were studied with regard to some of the metabolic disorders that might exist leading to the emaciation and cachexia which is so common. The serum-protein of normal persons is 6.9 ± 0.47 gm. %. In these patients serum proteins were 6.2 ± 0.67 gm. %. The hypoproteinæmia was not exclusively due to dietary deficiency, excessive bleeding or catabolism, but appeared to be the result of a defect in protein synthesis. One abnormality is the inability of the patient to absorb and metabolize glycine. This apparently is due to the presence of the cancer since following surgical removal of the growth normal plasma proteins were found. The need for a careful regimen to maintain normal nitrogen equilibrium is emphasized. The liver is not a storehouse for significant quantities of albumen. These patients often suffer from deprivation of tissue protein and are not able to compensate for the nitrogen debt which develops during the postoperative course.

BURNS PLEWES

One Year's Treatment of Non-specific Ulcerative Colitis with Intestinal Extract. Friedman, M. H. F.: *Am. J. Surg.*, **76:** 709, 1948.

To test whether ulcerative colitis is due to a deficiency of an intrinsic factor normally present in the intestinal mucosa, extracts of hog's small intestinal mucosa were fed to a series of patients. Of the 27 cases followed for over a year, symptomological and sigmoidoscopic evidences of improvement were seen in 24 cases. Withdrawal of the intestinal extract or substitution of a placebo resulted in a relapse. A remission could again be obtained by resumption of treatment.

This treatment is considered experimental. No specific factor has been found. Testing of the intestinal extract can only be done on patients with active ulcerative colitis.

BURNS PLEWES

Trauma Resulting from Atomic Explosions. Parsons, Capt. R. P.: *Am. J. Surg.*, **76:** 559, 1948.

For a radius of half a mile about the explosion of an atomic bomb, people will be killed three times over: by blast and flying debris, by burns from the heat and burning buildings, and by radiation. For the next half mile there will be fewer blast injuries, flash burns will be just as numerous but mostly non-fatal, radiation will cause thousands of deaths. At a distance of from one to 1½ miles away most injuries will be non-fatal flash burns. At two miles away the estimated momentary temperature reaches 3,000 to 9,000 degrees Centigrade. Immediate radiation deaths from neutrons differ from the later prolonged radiation illness from gamma particles. Only underwater explosions result in alpha and beta particles and a rain of death in the form of intensely radioactive fission products for perhaps thirty square miles. During the third and fourth weeks after the bombing most radiation deaths from leukopenia and anæmia will occur. Whole blood is the only known effective agent to save life in radiation sickness. These predictions are based on studies of the effects of the five atomic bombs already exploded. No information has been released regarding the later bombs.

BURNS PLEWES

Local Application of Aluminum Foil and Other Substances in Burn Therapy. Brown, W. A., Farmer, A. W. and Franks, W. R.: *Am. J. Surg.*, **76:** 594, 1948.

Pure aluminum foil .001 inches thick is easily obtained, cheap and is permeable. After sedation, the burn is cleansed with 1% cetavlon, saline and blotted dry. Autoclaved aluminum foil is smoothed on and a pressure dressing applied with bias flannelette. When the dressing is removed, the aluminum is shiny, there is very little dry exudate, and no maceration. In only one of the 50 cases described was there clinical evidence of infection. There was no evidence of local or general reaction to either aluminum foil or dust. Gold leaf and silver leaf give comparable results when applied to burns, but are very difficult to handle. Tin foil and tantalum foil are similar to aluminum foil for this purpose.

Aluminum foil is heat-reflecting, provides a physical barrier to the weeping of fluid from the burned surface, and is a defence against bacterial invasion. After 10 days aluminum foil is satisfactory but preparation for grafting may be slower than when the 3rd degree burns are treated with 1:12 hypochlorite solution. Titanium dioxide ointment was unsatisfactory as a burn application, being painful and delaying healing. That burned patients have a low urinary output and plasma level of ascorbic acid was confirmed. Local applications of ascorbic acid as an ointment, or in 5 to 10% aqueous solution, plus oral therapy, was efficacious in correcting this. Vitamin C also aided in separating slough from 3rd degree areas, but immediate pain was produced by its application. Blood glutathione was not found to be influenced by thermal burns. BURNS PLEWES

Obstetrics and Gynæcology

Meigs' Syndrome with a Granulosa-cell Tumour. Marshall, A. G.: *J. Obst. & Gyn. Brit. Emp.*, **56:** 86, 1949.

A case of Meigs' syndrome associated with a granulosa-cell tumour is reported. In a review of reported cases the inadequate histological details and the presence of cysts is noted. The frequency of menstrual disturbances is also stressed. It is suggested that a group of tumours related to the ovarian follicle is associated with Meigs' syndrome and that the degenerative features found in this group are the factors responsible. A plea is made for a more complete account of the structure of the tumours in future reports of this condition.

P. J. KEARNS

Pasini's Stain for Vaginal Smears. Bullough, W. S.: *J. Obst. & Gyn. Brit. Emp.*, **56:** 64, 1949.

The constitution of Pasini's stain is described, and its use for the examination of vaginal smears is advocated. A modification has also been developed by means of which the staining time is cut to only 30 seconds. The technique is extremely simple, and results in the uncornified epithelial cells appearing blue and the cornified cells red. Apart from its great value in determining the time of ovulation or the effects of age and of œstrogen therapy, Pasini's stain has also been used successfully in the diagnosis of uterine cancer. When used for this purpose, an initial fault with normal Pasini's stain was the excessively dense colour obtained with a staining time of three minutes. Consequently it is recommended that the smears should not be stained for longer than 30 seconds, or alternatively, dilution with 70% alcohol may be tried. Similarly, if the modified Pasini's stain is used, this should be diluted with 95% alcohol. In these ways Pasini's stain can be made to give excellent results. P. J. KEARNS

Pulmonary Embolism by Amniotic Fluid. Shotton, D. M. and Taylor C. W.: *J. Obst. & Gyn. Brit. Emp.*, **56:** 46, 1949.

A case of sudden death during labour, due to pulmonary embolism by amniotic fluid, is recorded, and reviewed with reference to 14 other recorded cases. Certain features combine to make this condition a clinical entity. The patient is usually a healthy multigravida, with a large, maybe postmature, fetus. Labour is violent and the baby often stillborn. During labour or shortly after delivery, there is a sudden onset of profound shock, with cyanosis and dyspnœa, terminating fatally in a few hours. At autopsy there is usually no obvious cause of death, but on microscopic examination of the lungs, emboli, consisting of the particulate contents of the amniotic fluid, are found in the smaller pulmonary vessels. P. J. KEARNS

Malignant Tumours of the Uterine Fundus Subsequent to Irradiation for Benign Pelvic Lesions. Speert, H. and Peightal, T. C.: *Am. J. Obst. & Gyn.*, **57:** 261, 1949.

Twenty-one patients among 270 with malignant tumours of the body of the uterus (8%) gave a history of previous irradiation of the pelvic organs with radium or x-rays for benign conditions. The incidence of previous pelvic irradiation among patients with cervical carcinoma, by contrast, was only 0.3%. Six of the 21 tumours contained sarcomatous elements. This was five times the incidence among all the malignant tumours of the uterine fundus. The average time interval between irradiation and detection of the uterine cancers was 8.3 years. These findings, together with previously published data in the literature, suggest a possible carcinogenic effect of radiant energy on the human uterine fundus.

ROSS MITCHELL

The Association of Maternal Obesity, Large Babies and Diabetes. Gilbert, J. A. L.: *Brit. M. J.*, **1:** 702, 1949.

Twenty-one women with obstetric histories of unexplained abortions, miscarriages, intrauterine deaths, stillbirths and neonatal deaths, and the birth of babies weighing 10 lb. or more, were admitted to hospital for investigation. Six of these patients were found to be diabetic. All six were grossly obese and five had had babies weighing 10 lb. or more. Evidence is brought forward to show a correlation between progressive maternal obesity, the birth of unusually large babies, and ensuing maternal diabetes. It is suggested that an excessive secretion of the growth factor during pregnancy may account for the associated phenomena.

ROSS MITCHELL

5,000 Consecutive Deliveries Without Maternal Death. Emblin, N.: *Brit. M. J.*, **1:** 260, 1949.

In the Halifax Municipal Obstetric Service there were between September 12, 1946 and October 5, 1948, 5,000 consecutive deliveries after the twenty-eighth week without a maternal death due to pregnancy. The cases were drawn from the widest possible sources. No emergency was ever refused admission. The stillbirth rate in the series was 23.07 per thousand and the neonatal death rate 11.91. A brief summary of the treatment of some major complications has been given. The belief is expressed that the most important single factor in reducing maternal mortality is the provision of a skilled staff to deal with emergencies. ROSS MITCHELL

Urethral Diverticulum in the Female. Counseller, V. S.: *Am. J. Obst. & Gyn.*, **57:** 236, 1949.

Diverticula of the female urethra in all probability originate from congenital defects in the urethra just as do diverticula in any other part of the body. They may be quiescent, but if non-specific infection and trauma disturb them in any way, symptoms develop. The exposed position of the female urethra and the high incidence of non-specific urethritis make it likely that, if a diverticulum is present, it will sooner or later produce symptoms and require surgical excision for a cure. These conclusions are formulated on the basis of 71 patients who have been treated surgically. ROSS MITCHELL

Neurology and Psychiatry

Studies on Headache. Analysis of Vascular Mechanisms in Headache by Use of the Human Centrifuge, with Observations on Pain Perception Under Increased Positive G. Kunkle, E. C., Lund, Capt. D. W. and Maher, Capt. P. J.: *Arch. Neurol. & Psych.*, **60:** 253, 1948.

The authors carried out an interesting series of experiments by the use of the human centrifuge. They showed that headache arising from painful distension of cranial arteries can be abolished during the application of a controlled mechanical stress, increased positive G. It was inferred that the elimination of such headache was a direct result of the concurrent fall in intravascular pressure at the head level and did not depend on a barrier to pain perception *per se*. A series of headaches of known vascular origin and others of suspected vascular origin all responded promptly to the centrifuge test. In subjects experiencing headache related to hunger, recent head trauma or emotional tension, all with clinical features suggesting that the pain arose from distension of intracranial or extracranial arteries, the headache was completely eliminated during exposure to a positive acceleration of 2.0 G. In a few instances the relief obtained outlasted the exposure to increased positive acceleration by one or two minutes. This suggests the possibility that cranial arterial tone may have been favourably altered for a short time by the transient fall in intramural pressure. A brief headache was sometimes noted in the normal subject during release from increased positive G; such headache probably arises from transient distension of cranial arteries, and in this respect is the analogue of headache induced by negative G. From these studies one would judge the human centrifuge to be a useful tool in the analysis of vascular mechanisms in headache. J. PRESTON ROBB

Efficacy of the Brief Clinical Interview Method in Predicting Adjustments. (Five year follow-up study of three hundred and four army inductees). Aita, J. A.: *Arch. Neurol. & Psychiat.*, **61:** 170, 1949.

It may be time now for a dispassionate look back at the controversy which raged in our Canadian army during World War II on the question of psychiatric screening of recruits. This recent paper by Dr. Aita presents interesting data on the value of the brief psychiatric interview as carried out in the United States army in 1941. Records had been kept of 250 recruits expected to do well as soldiers, and 250 considered to be doubtful, according to the brief psychiatric assessment. Follow-up information could be obtained after 5 years on 150 of those expected to be successful and 154 of the doubtful ones. With careful definitions of success, average adjustment, and failure, as a soldier, based on the records of the contributions of these individuals before separation from service, in relation to the cost of their training and upkeep, it was possible to determine the predictive value of the psychiatric assessments, which had been made without the help of questionnaires or other psychological devices which might improve them. Among the doubtful ones 21% were failures, while among the ones expected to be successful only 5% failed. However, if the doubtful ones had been rejected, the army would have lost the 49% of these who became average soldiers, and the 30% who became really successful soldiers. A review of the notes made during the 1941 assessments failed to indicate how the criteria from psychiatric interview alone could be changed to improve predictions.

Dr. Aita reached the conclusion that psychiatrists should continue to have a place in induction examinations, with additional help from questionnaires, social service data and psychological tests, but that they should reject only the recruits with definite psychiatric illnesses, and leave the doubtful cases for screening out later after a trial period of adjustment in the army. W. DONALD ROSS

The Involutional Psychoses. Malamud, W., Sands, S. L., Malamud, I. T. and Powers, P. J. P.: *Am. J. Psychiat.*, **105:** 567, 1949.

This report of a long term study from one of the leading centres of psychiatric research has value for the psychiatric orientation of the practicing physician. It points out that even in this group of psychiatric patients, where a certain biological epoch in life appears to be precipitating, and where a certain physical treatment (electro-convulsant therapy) appears to be very effective, the ultimate outcome of the illness is influenced greatly by the social setting to which the patient has to return. Hence no type of treatment can be considered adequate unless it includes a long-range program of social readjustment of the patient. W. DONALD ROSS

Industrial Medicine

The Noise Hazard. Grove, W. E.: *Indust. Med.*, **18:** 25, 1949.

That excessive noise is a health hazard and should be regarded as a liability by any industrial manager is stressed in this article. Efforts made to eliminate unnecessary noise will increase the efficiency of individuals and plants in a very marked degree. The author who is a member of The Committee on Conservation of Hearing, of the American Academy of Ophthalmology and Otolaryngology, pleads for the interest and co-operation of management in this matter.

Not all ears are equally susceptible to noise. The ears of the young are probably more susceptible than those of persons of middle life or advanced age. In the opinion of the author, based on the reported experience of several investigators, noise of less than a 90 decibel level can safely be disregarded. He states however, that in addition to the actual intensity of the noise, consideration must be given to other factors such as: total length of exposure, the length of exposure per period, whether the sound stimulus is continuous or interrupted, the length of interruptions, the type of space and environment with reference to reverberation, the age of the worker, and the presence of previous ear disease. The nature of the hearing defect, the medicolegal aspects and the remedy are also presented. The effect of excessive noise

progresses slowly and insidiously and the worker is apt to disregard it until he is quite deaf. Such cases have been reported in literature. Claims for industrial loss of hearing are mounting. To eliminate injurious noise at its source would be the ideal remedy but such an ideal is an impossible objective. The other alternative is to prevent noise from reaching the ear of the worker at an intensity above 90 decibels. The committee which the author represents is now working on one device for this purpose.

This committee also advocates a plant survey with a noise level meter to determine those plant locations and operations in which the noise level exceeds 90 decibels. In addition to this procedure it advocates a careful pre-employment audiometric hearing determination of every employee entering a given occupation. If that employee is placed on a job or in an operation in which the noise level as previously determined exceeds 90 decibels, it recommends that he be re-checked audiometrically in one week and again at stated intervals. It also recommends an audiometric re-check of any employee if, after working in a noisy environment, he develops buzzing or roaring in the ears. If on any of these re-checks it is found that the worker has developed an average loss of 10 decibels over the frequencies from 2,900 to 5,800, it is recommended that he should be forced to wear ear plugs or muffs or be transferred to some less noisy job; otherwise, that individual will develop a traumatic or occupational deafness. MARGARET H. WILTON

OBITUARIES

Dr. James A. Attridge, aged 78, died on May 22 of heart disease in his home at Port Huron, Ont. after an illness of three days. Born September 10, 1870, in Highgate, Ontario, he was educated there before entering the Detroit College of Medicine. Dr. Attridge was among five St. Clair County physicians honoured in June, 1947, by the St. Clair County Medical Society, for more than 50 years' service. He was a member of the American Medical Association, past president of the St. Clair County Medical Society, a member of Wayne County Medical Society and a Fellow of the American College of Surgeons. He was a member of the Port Huron Lodge No. 58, A.F. & A.M.; Port Huron Lodge No. 343 BPOE, and the Foresters, and Port Huron Lions Club. He is survived by his widow, two brothers, and two sisters.

Dr. Lawrence Broe of Port Hammond, B.C., died on June 25 in Royal Columbian Hospital, New Westminster. He was born in North Dakota and was an honour graduate of University of Toronto. After internship in Vancouver General Hospital he was attached to Granby Smelting Company in Anyox before setting up practice in Port Hammond where he was active until the time of his death. Survivors are his widow, two sons, his mother, two sisters and a brother.

Dr. Peter McGregor Brown died at his home in Camlachie, Ont., on July 4. Born and raised in Sarnia Township, he taught school for a short time before studying medicine. He graduated from the University of Toronto and opened an office in Camlachie, where he practised until his retirement 10 years ago. He was an elder of the United Church and he was a staunch and prominent Liberal all his life. He is survived by his widow and a sister.

Dr. Robert Kennedy Chalmers of Miniota died suddenly on July 27, while attending a patient at Beulah. He graduated in medicine from Manitoba Medical College in 1900 and practised continuously at Miniota. On June 21 he celebrated his 77th birthday. He was chairman of the Miniota municipal school district, an active member of Parkissimo Lodge I.O.O.F. and a member of the United Church.

Dr. Albert Comtois, a pioneer in radiology in Canada, died in Montreal on July 5, aged 55 years. He received his primary education at the parish school of Ste. Julie de Vercheres, and later attended L'Assomption College and Laval University in Montreal, where he received a degree of doctor of medicine in 1919. After attending leading medical teaching centres in Paris and London, where he studied radiology, he became electro-radiologist at Ste. Justine Hospital in 1921. He was appointed head of the radiology research centre and clinic of the hospital in 1928, and later became also an honorary radiologist of Ste. Jeanne d'Arc Hospital.

Dr. Joseph Michael Donnolly, died at his home in Saint John, July 19, following a long crippling illness. Dr. Donnolly graduated from McGill University in 1918, interned at the Montreal General Hospital and for many years practised in Montreal. For some time he has lived in semi-retirement in his home town of Saint John, N.B. As a young man Dr. Donnolly was well known as an athelete in several major sports.

Dr. W. E. Enright died suddenly on July 11 in his 73rd year while on vacation. Born at Danville, Que., October 25, 1876, he received his early education at Sherbrooke High School, later obtaining a B.A. from the University of Bishop's College, Lennoxville. In 1903 he received the degrees of M.D., C.M., from McGill University. After completing his internship he was attached to the staff of the Montreal General Hospital, becoming chief pædiatrician until he retired last year. Since then he has been a pædiatric consultant. He was a member of the St. James Literary Society of Montreal and the Medico-Chirurgical Society; the Montreal Badminton Club; the Summerlea and Kanawaki Golf Clubs and the Westmount Park Emmanuel Church. Dr. Enright is survived by a brother, Judge Frederick T. Enright.

Dr. Charles Roy Hignell died in Welland, Ont., on July 1, following a heart seizure.

Dr. Roswell Cameron Lyon died recently in Haileybury, Ont. Graduating from Queen's in 1918, Dr. Lyon practised in Chesterville for several years before coming to Haileybury in 1925. Within a few years he had developed a practice which reached into every hamlet in the Temiskaming area. Never known to have neglected a mercy call, day or night, he is thought to have hastened his death by overwork. His last illness began a fortnight ago and was diagnosed as coronary thrombosis.

Dr. Charles H. McDougall, aged 75, died recently in Strathroy, Ont. after a lengthy illness. Born in Caradoc Township, he graduated in medicine from Trinity College, then the medicine school of the University of Toronto, and later studied in England. He had practised medicine in Strathroy for 45 years and was actively interested in the Strathroy General Hospital from its earliest days. He is survived by his widow, one brother and one sister.

Dr. Andrew R. McMillen died in Sarnia General Hospital, July 11, after an illness of six months. He was born in Elgin County in 1884, and attended Lucan High School and London Model School, after which he taught for several years before entering University of Western Ontario, receiving his M.D. in 1908. He practised in Wilkesport, Lambton County, in 1909 in the horse and buggy days. Two events stand out prominently in his practice here. Once when the Sydenham river was in flood, he would cross the river in a flat bottomed boat with a long rope on both ends of the boat and tied to a tree on each side of the river. He would sit down in the boat and pull on the rope until he got to the other side, and then travel either by cart or on horseback to reach his destination, re-crossing the

river, often in the dark, in the same manner. The other event occurred when the roads were axle deep. He performed an emergency Cæsarean section in a farm house, an operation which he had never seen. Both mother and babe are still alive. During the 1918 'flu epidemic he was one of seven greatly overworked physicians, and his books show that besides office and hospital work, he made in one day sixty-seven house calls.

Always an active Conservative he represented West Lambton in the Provincial Legislature from 1929 to 1934. He belonged to the Kiwanis Club and was Lieut.-Governor of the district comprising Ontario, Quebec and the Maritimes. He was a Mason, belonging to the Knight Templars, and the Mystic Shrine, and an Oddfellow, as well as a Member of the Knights of Pythias. Dr. McMillen was a man of varied interests, and at the time of his death was President of the Sarnia Bus Company Ltd., a Director of the Family Laundry, and had recently completed a 20-unit housing project near Oakwood Corners.

He is survived by his widow and three sons.

Dr. William Samuel Partridge, aged 79, of London, Ont., a native of Tynewydd, South Wales, and resident of Ontario for 22 years, died June 24 at Sir Adam Beck Memorial Sanatorium. He had been in ill health for seven years. He is survived by two sons, one brother and two sisters.

Dr Emile Simard, d'Amos, est décédé le 22 juin à Québec, à l'âge de 61. Il laisse son épouse, deux fils et trois filles.

Dr. Charles A. Wigle died at the G. and M. Hospital, Owen Sound on June 7, after he had been a patient there for the past three months. A native of Wiarton, he had resided here all his life, aside from the period in which he studied medicine. He graduated from McGill University and then took a postgraduate course in New York City, before commencing his practice in Wiarton where he also operated a drug store. Dr. Wigle was a member of Trinity Anglican Church. He took a keen interest in community affairs and was a former member of the local High School Board. A great lover of sports, particularly hockey, he was president of the Wiarton Redmen in the days when that club was a power in the hockey world. He was also a member of Cedar Lodge, Wiarton, as well as a member of the Loyal Orange Lodge. He is survived by his widow and one sister.

NEWS ITEMS

Alberta

The Annual Convention of the Alberta Medical Association is being held in the Medical Building of the University of Alberta on September 20 to 22 inclusive; Dr. G. R. Davison is Chairman of the Committee of the arrangement and program.

Dr. J. W. Richardson of Calgary is spending the summer touring England and the Continent of Europe and will return in the Fall to his practice in Calgary.

Dr. Morley Tuttle of Lethbridge is taking postgraduate work in Montreal and will return later in the Fall.

Among those medical men from England who have taken up practice in the Province and who were successful in their Dominion Councils were Dr. R. T. Puddicombe of Leduc and Dr. B. J. O'Sullivan of Drumheller.

Dr. Morley Young of Lamont was appointed Representative of the C. P. & S. on the Health Survey Committee. Dr. A. E. Archer held this position prior to his death.

Dr. J. A. Gillette of the Department of Health of the Province has joined the Imperial Oil staff as physician-at-large, with headquarters in Edmonton.

Dr. J. L. MacPherson has recovered from his recent illness and is carrying on practice at Ryley.

W. CARLETON WHITESIDE

British Columbia

The University of British Columbia has, at long last, a Medical Faculty. It is hoped that the autumn of 1950 will see the admission of the first medical students to undertake training, and to receive a full medical education.

The Dean of the new Medical School has been appointed by the University Senate, in the person of Dr. Myron M. Weaver, late Assistant Dean of the Medical School of the University of Minnesota. It is of interest to note that the first President of the University of British Columbia, Dr. F. F. Wesbrook, also came from the same university in Minnesota.

Dr. Weaver has had a brilliant career in medicine, and holds many degrees and diplomas. His chief interest has been in internal medicine. He is 47 years of age. He assumed his new duties as dean on July 1, 1949, and will spend the next year organizing the Medical School.

Plans are on foot for the erection of the buildings necessary for the operation of the Medical School, to be placed on the Campus of the University. It is hoped that eventually a University Hospital will be built—but this is not possible at present. In the meantime, the wards of the Vancouver General Hospital will be utilized for clinical teaching. Other hospitals and special clinics, such as the Tuberculosis Institute, the Cancer Institute, etc., will also doubtless be available.

There is a definite outbreak of polio in Vancouver at present, and while it has not reached alarming levels, it is still serious enough. At the time of writing, there have been some 56 cases, of which 42 or 43 are still in hospital. There have been two deaths, an adult and a fifteen-year old boy. A considerable number of adults have been affected, and there are many atypical cases. The Polio Committee, composed of specialists in each department of medicine, is doing excellent work in guiding and counselling practitioners who have encountered cases in their practice.

The city owes a special debt of gratitude to the Kinsmen's Club of Vancouver, a well known Service Club. This organization has identified itself especially with the treatment of poliomyelitis, and in the past few years has contributed more than $40,000 worth of equipment. It is extremely active in the present crisis, and is providing a great deal of extra aid, in the form of iron lungs, packs, etc. It is impossible to overestimate the help that has come from this source.

The epidemic has thrown a great deal of strain on the already far too busy nursing staff of the hospital, and appeals have been made to retired nurses to come and help. To date all requests have been met, to the great credit of these public-spirited women, many of whom have homes and businesses of their own, and who have to make a great sacrifice in their contribution of time and skill.

The new British Columbia Medical Research Institute, inaugurated a year ago, is going ahead actively. It was at first based on research into special thoracic surgery, particularly on blue babies. Recently, the provincial division of the Canadian Cancer Society has granted $50,000 to the Institute to enable the latter to acquire offices, animal rooms, laboratories and a library, with which to go ahead in research.

Dr. G. F. Strong of Vancouver is the Chairman of the Medical Board of the Institute. Others on the Board are Drs. W. H. Hatfield, Ross Robertson, D. H.

Williams and Myron M. Weaver, the Dean of the Medical School of the U.B.C. His presence on the Board links up the Institute with the University and Medical School.

The objective of the Institute will be general medical research. Its inauguration constitutes a considerable forward step in medical education in the Province.

The annual meeting of the British Columbia Medical Association will be held in Victoria, from September 27 to 30 inclusive. The Empress Hotel will be the headquarters of the meeting, and a very full program is being arranged, including a clinical program of rather unusual interest. There will also be business meetings, and a very varied program of entertainment. There will be golf, luncheons and dinners, and the ladies attending will be very well taken care of. Victoria at any time of year is an ideal place for conventions, and September is practically always a lovely month there.

The annual meeting of the British Columbia College of Physicians and Surgeons will be held at the same time. At the annual dinner of the British Columbia Medical Association, held at the close of the Session, the new Dean of Medicine of the University of British Columbia, will be the guest speaker, and this will be his introduction to the profession of medicine of B.C.

The Department of Medicine of the Vancouver General Hospital has, in keeping with its annual practice, secured the services of two outstanding internists, who will act as visiting chiefs of medicine, for a period of a week each, will give clinics and lectures in the Hospital, to which all members of the profession are invited, and will, it is hoped, address the Vancouver Medical Association formally.

Their visits are timed for October, 1949, and April, 1950, respectively. The first visiting chief will be Sir John Parkinson of London, England, who will be here from October 3 to 7, inclusive. The visiting chief next April will be Dr. Cecil J. Watson, Professor of Medicine at the University of Minnesota, who will be here from April 3 to 7, inclusive.

The first report is now available on the working of the Fund set up by the Government of British Columbia for payment for medical services to social assistance cases. This Fund is administered by the College of Physicians and Surgeons through a special Board of Trustees.

Bills are rendered according to a schedule of fees based on the regular Scale of Fees current in B.C. They are rendered at any time, but payment is based on a three-month period being self-contained. Only bills received by a fixed date are considered for the period, and there is no carry-over. During the first three months, March 1 to May 31, payment was made on the basis of 70% of the total amount submitted, the discount being "across the board". This is regarded, on the whole, as fairly satisfactory, but it shows that the estimate of the amount of money necessary to meet the costs of this class of practice was by no means high—in fact it was not adequate. All bills are carefully scrutinized and taxed, if necessary, by the Board, and cannot be regarded as unduly large.

J. H. MACDERMOT

Manitoba

Dr. Lennox Gordon Bell has been appointed Dean of the Faculty of Medicine in succession to Dr. A. T. Mathers who retired in August. Dr. Bell has been raised to rank of professor and will assist Professor J. D. Adamson in the teaching of medicine. He is the only son of the late Professor Gordon Bell, and the news of his appointment has been generally acclaimed.

Arrangements are being made whereby Sir Lionel Whitby, President of the British Medical Association, will deliver the Gordon Bell Memorial Lecture in Winnipeg about September 14, under the auspices of the Winnipeg Medical Society.

On June 18 some 700 ex-patients and members of the staff of Manitoba Sanatorium at Ninette met on the grounds of the institution for a re-union. The re-union actually began at the Union Station in Winnipeg where over 200 Sanatorium "graduates" boarded a special train. Dr. A. L. Paine, Superintendent of Manitoba Sanatorium extended a welcome to all visitors, and there were other speeches, especially one by Dr. E. L. Ross, former Superintendent at Ninette, now Medical Director of the Sanatorium Board, who first joined the staff 24 years ago. There was also music by the band from the Canadian Joint Air Training Centre at Rivers, dancing and singing. Two former patients, one from Toronto, another from Madsen, Ont., made the trip especially for the event. The sanatorium was started forty years ago with the late Dr. D. A. Stewart as first Superintendent.

Col. T. E. Holland has been appointed A.D.M.S. Reserve Forces, Prairie Command, which extends from the Lakehead to the Alberta boundary. With these duties and those as President of the Winnipeg Medical Society, in addition to his professional work Dr. Holland will find his time well occupied.

The Manitoba physicians who attended the annual meeting of the Canadian Medical Association at Saskatoon were well pleased with the hospitality shown by the Saskatchewan doctors. It is no light task to stage an annual meeting for such a large group as the Canadian Medical Association, but the arrangements had been carefully planned, and the welcome was in true Western style.

The Medical Advisory Committee of the Sanatorium Board recommends the appointment of the full-time pathologist to supervise the laboratories at the various sanatoria, to initiate new techniques, and to stimulate interest in tuberculosis, especially in the fields of bacteriology and chemotherapy.

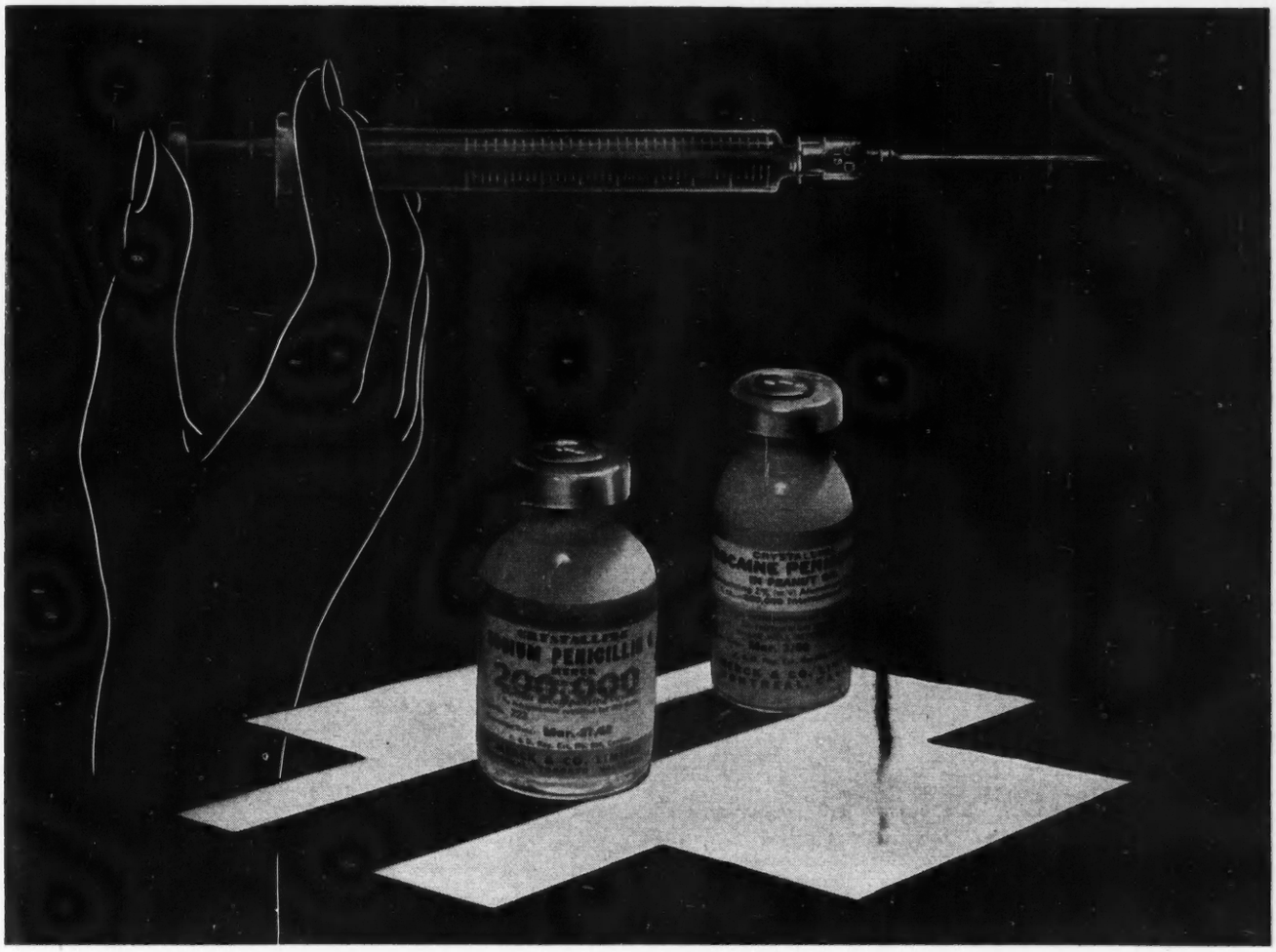
X-ray chest examinations of patients on admission are now being carried out at the Winnipeg General, St. Boniface and Dauphin Hospitals. In the near future Brandon General Hospital and Victoria Hospital, Winnipeg, will undertake this work, and later Misericordia and Grace and St. Joseph's Hospitals in Winnipeg and Portage la Prairie Hospital will offer this service.

A new hospital district has been set up under the Manitoba Health Services Act. The project calls for a capital expenditure not to exceed $165,000, of which $90,000 will be for a 20 bed hospital at Shoal Lake, $60,000 for a medical nursing unit at Rossburn and $15,000 for a nursing unit at Elphinstone. The hospital building at Shoal Lake will be remodelled and enlarged. The nursing unit at Rossburn will have 10 beds and a nursery with six bassinets, a case room and operating room for emergency and minor surgery. The unit at Elphinstone will have 3 or 4 beds, a case room and adequate facilities for care of patients.

Dr. David Aikenhead has successfully passed the M.R.C.P.(Lond.) examinations. ROSS MITCHELL

New Brunswick

Physicians and hospital authorities will be pleased by the appointment of Dr. R. J. Dolan as Director of Hospital Services and of the Cancer Diagnostic Service of the New Brunswick Department of Health. Dr. Dolan is a graduate of Queen's University. He practised at Nelson for some years. Then served in the R.C.A.M.C. in the last war and following that he was superintendant of the D.V.A. hospital at Sussex, and lately he has been



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district medical officer for the D.V.A. in Saint John. Dr. Dolan succeeds Dr. D. W. F. Porter, as director of the services detailed above.

Dr. R. A. H. MacKeen, Director of Laboratories for the Province of New Brunswick, became a charter fellow of the International Society of Hæmatology at the first congress held at Buffalo, New York in August, 1948. He also was made a fellow of the Royal Society of Tropical Medicines and Hygiene in January, 1949.

A. S. KIRKLAND

Ontario

The University of Toronto Faculty of Medicine has appointed Dr. H. L. Ormsby, Clinical Teacher, in charge of Eye Bacteriology, and Dr. O. B. Richardson, Clinical Teacher in charge of Eye Pathology, in the Department of Ophthalmology.

Dr. J. H. Holbrook unveiled a bronze plaque on July 12 at the Hamilton Academy of Medicine, dedicated to the memory of Sir William Osler who was born on July 12 exactly 100 years ago. Inscribed on the plaque was: "Erected by the Hamilton Academy of Medicine to commemorate the 100th anniversary of the birth of Sir William Osler, Bart."

Earlier in the afternoon doctors and others stood beside the Osler Memorial Cairn, erected more than 20 years ago on Hamilton Hill, overlooking the town of Dundas where young William Osler lived and worked. Here under the shade of the trees, Dr. N. B. Gwynn of Toronto, a nephew of Sir William, placed a wreath, the gift of the Academy at the foot of the stone cairn. The Venerable Archdeacon Mackintosh offered prayers.

Dr. Gwynn told the gathering that the scientific life of Sir William had begun just under their feet. He referred to the town spread below the hill. It was there in the old canal and the old canal basin that Sir William had gathered samples. It was in medical offices still occupied by doctors that he had made tests and handled bottles still in use.

Dr. Joseph A. Sullivan addressed the International Congress of Otolaryngology which met in England in July on "The Surgery of Deafness".

Dr. Robert L. Noble, University of Western Ontario, will speak on "The Present Status of Posterior Lobe Hormones", at the Laurentian Hormone Conference in Franconia, New Hampshire in September.

The National Cancer Institute has instituted a tumour registry at Ottawa under the direction of a committee including Dr. L. C. Simard, University of Montreal; Dr. H. A. Ansley and Dr. James Gibbard of the Federal Health Department, Dr. Max Klotz and Dr. Desmond Magner of Ottawa. The man directly in charge is Dr. Magner, professor of pathology at the University of Ottawa. He will have a small permanent staff. The registry will contain not only tissue but all the data on each case and a record of the final outcome. A cross-section of typical tumours will be kept as well as unusual types so that research workers can make studies on a broad foundation.

Dr. R. Gordon Bell of Toronto has been appointed a member of the committee on alcoholism of the American Association of Industrial Physicians and Surgeons.

Miss Edith Wark, director of dietetics, Toronto Western Hospital, has been named president-elect of the Canadian Dietetic Association.

A medical expedition from Queen's University is spending the summer at Coral Harbour, Southampton Island at the northern end of Hudson's Bay studying the effects of climate on health, the incidence of certain diseases among people of northern latitudes and the prevalence of parasitic infections among the Eskimos. Dr. Malcolm Brown heads the undertaking. Others in the group include: Dr. Thomas Boag; Dr. J. D. Hatcher, of University of Western Ontario; and medical students, John Green, John Page and Don Whittier. Some of the equipment includes an electrocardiograph, a portable x-ray, a basal metabolism machine and deep freeze equipment to quick freeze specimens which will be flown back to the laboratories at Kingston. From the studies planned it is expected that information will be gained which will be of value to all peoples forced to live in an extremely cold climate. The 1948 party from Queen's discovered the thichenella parasites in polar bears which is significant in the Arctic where meat is often eaten raw.

Dr. Okechukwu Ikejiani, former demonstrator in bacteriology, University of Toronto, is now senior lecturer and head of the department of Pathology and Bacteriology in University College Medical School, Ibadan, Nigeria, West Africa. He is also pathologist at Adeoyo Hospital, Ibadan.

Dr. Hurst Brown has been appointed chief of the department of medicine, Toronto Western Hospital, succeeding Dr. H. K. Detweiler. Dr. Brown is a graduate of the universities of Saskatchewan and Toronto. He won a Rhodes Scholarship to Oxford in 1922. He was a colonel in the R.C.A.M.C. during the war.

Erratum:

Dr. Herbert Levitt is teaching at the Orthoptic Course at Nason College, Maine this summer, not at the Orthopædic Course as stated in the July *Journal*.

LILLIAN A. CHASE

Quebec

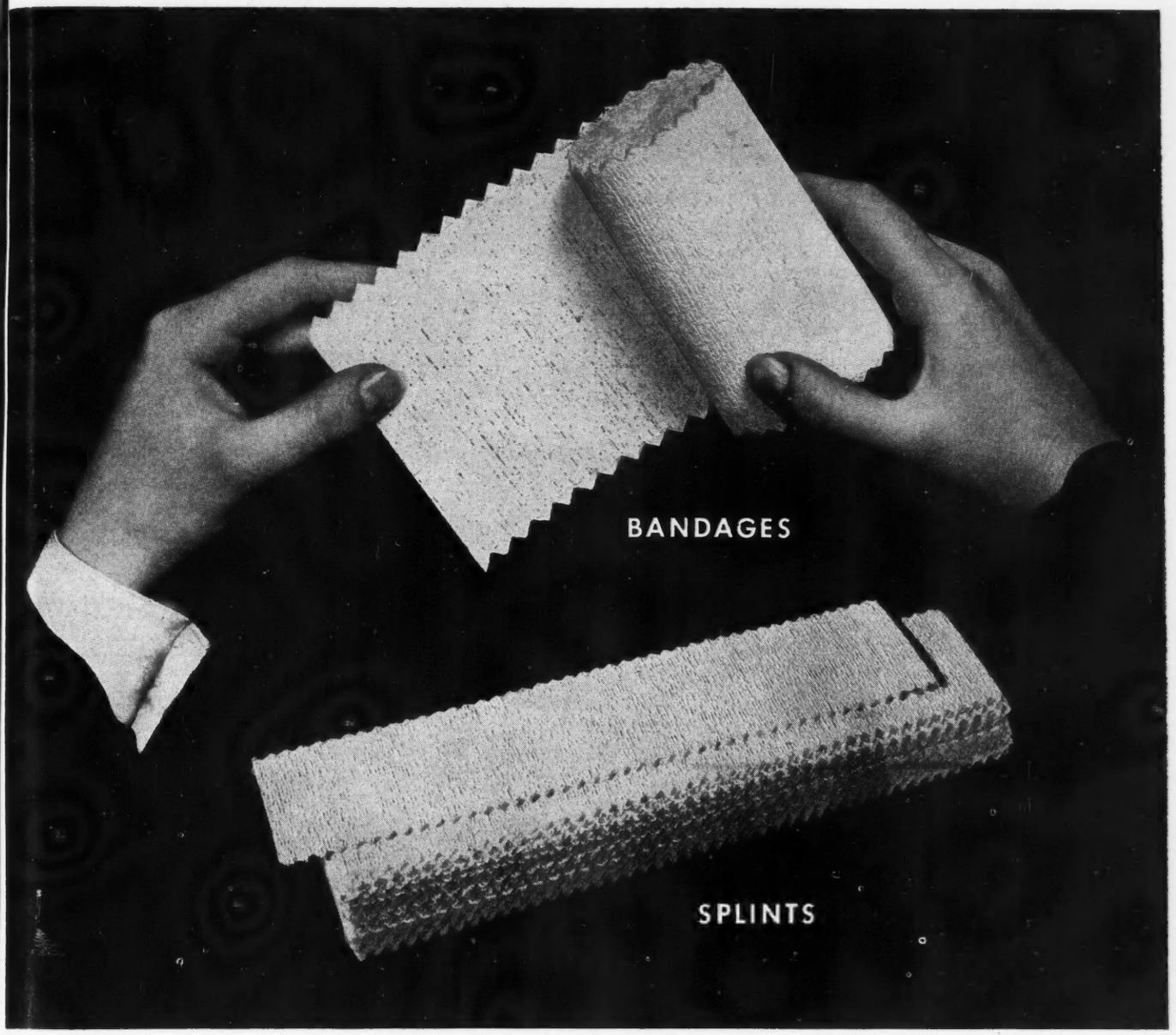
The Centenary of the birth of Wm. Osler was celebrated in Montreal on July 11. A dinner privately arranged was held in the evening and was attended by more than 50 medical men. The chairman first introduced Dr. C. F. Martin whose association and friendship with Osler dated back to the early nineties in the Montreal General Hospital. Dr. Martin, speaking with his usual easy attractive manner, recalled the hospital as it was in Osler's day, small, ill-lighted, with nothing that we now think of as equipment. The smell of iodoform was persistent, with the addition from time to time of carbolic as these were the days of Lister's carbolic spray for operating. Men operated with bare hands, often in their shirtsleeves, and yet, comparatively speaking, sepsis was not excessive, as their manual skill was very great. It was in bare, simple surroundings such as this that Osler did his monumental pathological work. His postmortem room was little more than a shed, with no light but an oil lamp, a small stove for winter, and a bucket of water. How he escaped infection from the hundreds of typhoid cases he saw and autopsied was a miracle.

But Osler was driven by an incessant energy which made his work a delight to him and yet, great as was his industry, it was not that which endeared him so deeply to his countless friends. He had a personal charm which was irresistible and he consistently followed the highest principles of his vocation.

The toast to Osler was proposed by another famous pupil, Dr. Wilder Penfield, who spoke briefly in personal reminiscence. He recalled his first attempt in an autopsy to remove the skull cap. Osler happened to come in and after watching him for a while he said "Well, it's always good to do a thing wrongly the first time".

The toast was duly honoured from Osler's silver tankard belonging to the Osler Society, which was passed around with the accepted ritual.

Dr. W. W. Francis then gave a charmingly light running commentary on various personal aspects of Osler. He spoke finally of Sir William's capacity to govern his emotions, as was particularly shown on the occasion of the death of Revere his son. Both Sir



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William and Lady Osler made a point of carrying on their many daily duties without pause. But even Sir William could not withstand the power of his grief in the nights when he sometimes broke down entirely.

At the close of the dinner Dr. Francis invited the guests to an inspection of some specially chosen Osleriana in the Osler Library, thus providing a fitting ending to a historic occasion. It should be added that by special arrangement steps were taken to ensure representation of the memory of Dr. Egerton Y. Davis of Caughnawaga, Dr. Osler's quondam and shadowy acquaintance whose spirit is now sheltering in the embrace of the Lachine Rapids. The impersonation was capitally carried out by Dr. Sean Murphy, Past President of the McGill Medical Undergraduate Society.

Aux dernières élections de la faculté de médecine de l'université de Montréal les médecins suivants furent élus. Dr Edmond Dubé, doyen; Dr Léon Gérin-Lajoie, vice-doyen; Dr Emile Legrand sécrétaire. Les Drs C.-E. Grignon, E. Desjardins, J. Saucier, E. Robillard furent nommés au conseil de l'Exécutif.

Le Dr Rodrigue Lefebvre a été élu président de la société de Cardiologie de Montréal.

Jacques Joubert et François Léger, étudiants en médecine de l'université de Montréal se sont rendus à Bréda en Hollande comme délégués au séminaire de l'International Students Service.

Dr Gilles Bertrand s'est embarqué à New-York le 20 août à bord de l'Ile-de-France. Le docteur Bertrand bénificie d'une bourse du gouvernement provincial lui permettant de poursuivre ses études de neurologie clinique à Paris à la Salpétrière sous la direction du Professeur Garcin. Il participera au Congrès international de Neurologie qui doit avoir lieu au début de septembre.

Le docteur Claude Bertrand chef du service de neurochirurgie de l'hopital Notre-Dame et le docteur Jean Saucier Chef du service de neurologie de l'Hotel-Dieu prennent aussi part à ce congrès. Y. PRÉVOST

General

Alexander Pigott Wernher Memorial Trust Fund.—In accordance with a scheme approved by the Trustees, an allocation of £4,000 per annum has been made for the award of travelling fellowships or grants in furtherance of the objects of the Fund, which are defined as being for "the prevention and cure of blindness and deafness in the United Kingdom and British Empire, and in particular research in connection therewith by financing medical men and students within the Empire to study methods and practices in all countries of the world". These awards will be made primarily for research in ophthalmology and otology, for periods of up to a year, but grants may also be given for short-term visits abroad to study new methods of investigation and treatment in these fields. These funds will be administered by the Medical Research Council, and applications should accordingly be addressed to the Secretary at 38 Old Queen Street, Westminster, London, S.W.1.

Iodine Abstracts and Reviews. A new bi-monthly periodical, Iodine Abstracts and Reviews, is being prepared by the Iodine Fellowship at Mellon Institute, Pittsburgh 13, Pa., to provide summaries of scientific and technical literature relating to the uses of iodine and its compounds in chemistry and in the industries. From time to time there will be presented reviews of specific phases of the science and technology of iodine. Complimentary subscriptions may be secured by addressing the Iodine Educational Bureau, Inc., 120 Broadway, New York 5, N.Y.

Book Reviews

The Chest and the Heart. Volume I. The Chest, edited by J. A. Myers, Professor of Medicine and Preventive Medicine and Public Health, University of Minnesota Medical and Graduate Schools, Minneapolis. 1021 pp., illust. Volume II. The Heart, edited by C. A. McKinlay, Clinical Professor of Medicine, University of Minnesota Medical School, Minneapolis. 825 pp., illust. Set: $32.00. Charles C. Thomas, Springfield, Ill.; Ryerson Press, Toronto.

This work is a two-volume collection from 61 contributors which deals with the diseases of the lungs and heart. There are 88 separate articles covering a wide range of possible approaches to the study of these organs, and the sum total, with 60 pages of index and extensive bibliographies, constitutes a useful and encyclopædic repository of information and opinion for those interested. The books, which would serve both for purposes of study and reference, are well bound and printed on excellent paper and are well illustrated.

To speak critically of this collection, one wonders why, in a work of particular appeal to graduates and those especially interested in the more advanced study of these diseases, considerable space is devoted to a description of the routine clinical examination of the chest. A curious omission is the absence, in the section dealing with the lungs, of a detailed account of the segmental subdivisions of the bronchi. These are, however, not great shortcomings and one can certainly recommend the volumes to all those who have need for such a collection.

Psychiatry in General Practice. M. W. Thorner, Assistant Professor of Neurology, Graduate School of Medicine, University of Pennsylvania. 659 pp. $9.00. W. B. Saunders Co., Philadelphia and London; McAinsh & Co. Ltd., Toronto, 1948.

The purpose of this book as stated by the author is to give students or physicians "the feel of the psychiatric patient and his problems". It presents a refreshingly direct and human approach to the patient. The author has adopted an original and rather unorthodox method. He gives his case histories in non-technical language letting, wherever possible, the patient speak in his own words. Most of these case histories are fascinating, colourful, human interest stories, some of them revealing the author's remarkable ability. Instead of describing symptoms, syndromes, and disease entities and then illustrating the various concepts with cases, the author presents the people first. There is a chapter on intelligent people and dull people, on people and sex, on people and catastrophes, on unhappy people and confused people, dementing people and dreamy people, anxious people and suspicious people, queer and twisted people, older people and the children, and finally on the rest of us. Psychopathology, psychodynamics, and psychotherapy are discussed as they are brought to the surface in the encounter with these troubled people. The book contains another section dealing in a more systematic manner with the methods of psychiatric examination and treatment by physical and psychological methods. The author's desire to avoid technical language has caused him at times to become unnecessarily wordy. It is neither shorter nor simpler to speak of "clearsightedness" instead of "insight" even though the latter expression happens to be the accepted psychiatric term. One comes across such words as "concupiscence" and "concatenation". It seems unnecessary to quote in German if seventeen words of it contain three typographical errors. Most geneticists would probably object to the author's statement that "there is no good reason to believe that manic depressive disease is inherited . . .". Under the treatment of delirium tremens, one would wish to see the author recommend larger doses of vitamin B complex and particularly the use of insulin in combination with the intravenous administration of glucose saline. One very important omission is noted in a book dealing with the treatment the general

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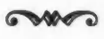

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practitioner may employ when faced with psychiatric problems, namely the use of subcoma or modified insulin treatment of anxiety and tension states. These criticisms, however, should not detract from the value of this original, interesting, and thoughtful introduction into psychiatry.

Tuberculosis in Childhood. D. S. Price, Physician, St. Ultan's Infant Hospital, Dublin, and H. F. MacAuley, Orthopædic Surgeon, Mater Misericordiæ Hospital, Dublin. 219 pp., illust., 2nd ed. $6.25. John Wright & Sons Ltd., Bristol; Macmillan Co. of Canada, Toronto, 1948.

This small monograph is written by an author who has spent at least fifteen years in clinical investigation into tuberculosis in childhood. The main theme has to do with early detection of the primary lesion and its immediate treatment. The suggested ways of doing this are set forth after a thorough discussion of the nature of the lesion and its possible sequelæ. There is a valuable chapter on the use of the tuberculin test, and a great deal of space is given to B.C.G. which is played up to the full, much more so than would seem to the reviewer to be justified. Like all medical books it is considerably out of date before it is even published. This is particularly noticeable in connection with treatment, streptomycin being mentioned only once and no information with regard to its dosage, toxicity, etc. given. There is a good deal of repetition throughout, but taking it all in all, the writer is to be congratulated on assembling the data as nicely as she has. There is no doubt but that it should be recommended to all physicians dealing with childhood and adolescent diseases and to those especially interested in tuberculosis. This recommendation should, however, be coupled with the caution that it be read in conjunction with other works on tuberculosis, since the teachings are not entirely orthodox.

Clinical Urology. L. E. McCrea, Clinical Professor of Urology, Temple University Medical School; Attending Urologist, Philadelphia General Hospital. 503 pp., illust., 2nd ed. $6.50. F. A. Davis Co., Philadelphia, 1948.

According to the preface, a great amount of the text has been completely re-written, and a new index provided. The book seems to represent the opinions and current practices of its author, and to have been written without exhaustive search of the recent literature. Thus has been avoided the long discussions of controversial points which in some texts leave the reader with much information but no answers. There are occasional omissions which seem curious to the reviewer, most notably that the recommended treatment for *E. coli* infections does not include the sulfonamides. A few ideas which are now generally considered outmoded are included. These defects are overwhelmingly compensated for in other parts of the book. For example one statement, on p. 398, is so good as to deserve quotation: "Early diagnosis of renal neoplasm is difficult . . . because of the general laxity of both the profession and the laity in their utter disregard of the importance of painless hæmaturia". Altogether this is a very convenient and useful book, but not a reference volume.

Commonsense Psychiatry of Dr. Adolf Meyer. Fifty-two selected papers edited, with biographical narrative, by Alfred Lief. 677 pp. $6.50. McGraw-Hill Book Co., Inc., New York, Toronto, London, 1948.

The editor has selected fifty-two of Dr. Meyer's published papers and addresses dating from 1895 to 1944 for incorporation in the book. These were selected as being representative of Meyer's ideas, indicating the formation of his concepts and their part in the development of psychiatry as a science. Interspersed amongst his papers are chapters written by the editor giving biographical material about Meyer and describing the problems which were confronted by American psychiatry at the various periods the papers were written. The reader is made aware of how Meyer's organizing ability and clear thinking, with the emphasis he placed on a proper study of patients as individuals, influenced American psychiatric thought. It is clearly shown how he contributed to the emergence of American psychiatry from the shackling effect of the dogmatic teaching of the nineteenth century when there was undue preoccupation with diagnosis to the neglect of treatment. All the papers and addresses selected for the book are written in simple language and will be entirely comprehensible to the non-medical reader. Most of the subjects have popular interest, since not a few of them were given before lay organizations. There can be no doubt that the book should succeed in fulfilling the expectation of the editor who states that he has undertaken to give the average person a better understanding of Dr. Meyer's work. It should also be a great help to anyone desiring to learn the fundamentals of psychiatry.

Control of Pain in Childbirth. C. B. Lull, Director, Division of Obstetrics and Gynæcology, Philadelphia Lying-in Unit, Pennsylvania Hospital; and R. A. Hingson, Associate Professor of Obstetrics; Anæsthesiologist, Department of Obstetrics, Johns Hopkins University and Hospital. 522 pp., illust., 3rd ed. $14.00. J. B. Lippincott Co., Philadelphia, London, Montreal, 1948.

Of the 160 pages added in this third edition, the authors have devoted a number to a statistical survey of stillbirth and neonatal mortality rates in several large centres. In these centres, it appears that trained physician-anæsthetists, employing the various nerve block techniques, have brought new safety to the delivery room. Lull and Hingson, crusading for caudal analgesia, naturally expend considerable space in a detailed exposition of the anatomy, physiology, pharmacology and manual technique involved in this method. However, the older ways of easing the labouring mother are not overlooked. Perhaps it is here that the rural practitioner will find the book most useful. The anæsthetic aspects of normal and pathologic labour are carefully reviewed and advice offered for safe pain relief in difficult cases.

In conclusion, the authors see in the future the physician-anæsthetist and the obstetrician "working as a team". Anæsthetist or obstetrician, whichever the reader be, he will doubtless agree with one pithy sentence, "Every woman should have impressed upon her that there is no such thing as absolutely painless childbirth, and no woman should be promised any special type of analgesia or anæsthesia before she goes into labour".

Books Received

Liver Injury. Edited by F. W. Hoffbauer. 74 pp., illust. $2.00. Mayo Foundation, Rochester, Minn., 1947.

Médecine Pratique. Leçons publiées sous la direction du Professeur Camille Lian. 191 pp. 700 fr. L'Expansion Scientifique Française, Paris, 1948.

Occupational Marks and Other Physical Signs. F. Ronchese, Instructor in Dermatology, Boston University School of Medicine; foreword by John G. Downing, Professor of Dermatology, Boston University School of Medicine and Tufts College Medical School, Boston, Mass. 181 pp., illust. $5.50. Grune & Stratton, New York, 1948.

Osteotomy of the Long Bones. H. Milch, Consulting Orthopædist, Maimonides Hospital, New York. 320 pp., illust. $8.50. Charles C. Thomas, Springfield, Ill.; The Ryerson Press, Toronto, 1947.

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1. Sheldon, J. M. et al: Univ. Mich. Hosp. Bull. 14:13-15 (1948). 2. MacQuiddy, E. L.: Neb. State M. J. 34:123 (1949)

Books Received

Books are acknowledged as received, but in some cases reviews will also be made in later issues.

British Encyclopædia of Medical Practice 1949 and Cumulative Supplement 1949. Editor-in-Chief, Rt. Hon. Lord Horder, Physician to the King. Butterworth & Co. (Publishers), Ltd., London, 1949.

Child Health Services and Pædiatric Education. Report of the Committee for the Study of Child Health Services, The American Academy of Pædiatrics. 270 pp., illust. $3.50. The Commonwealth Fund, New York, 1949.

Comparative Anatomy. L. A. Adams, University of Illinois; and S. Eddy, University of Minnesota. 520 pp., illust. $5.00. John Wiley & Sons, Inc., New York, 1949.

Evolution of the Forebrain. G. W. H. Schepers, D.Sc., M.D., Johannesburg, South Africa. 212 pp., illust. 50/-. Maskew Miller Limited, Cape Town, 1948.

German-English Medical Dictionary. F. S. Schoenewald, M.D., Berlin. 241 pp. 27s. 6d. H. K. Lewis & Co. Ltd., London, 1949.

Hearing is Believing. M. H. Heiner, President, Cleveland Hearing and Speech Centre. 126 pp. $2.50. The World Publishing Company, Cleveland and New York, 1949.

Journal of the History of Medicine and Allied Sciences. Anæsthesia Centennial Number. Vol. I, No. 4. George Rosen, Editor. 295 pp., illust. $2.50. Henry Schuman, New York, 1946.

Nursing of the Sick 1893. I. A. Hampton, and others. Papers and Discussions from the International Congress of Charities, Correction and Philanthropy, Chicago, 1893, published in 1949 under the sponsorship of the National League of Nursing Education. 218 pp. $3.85. McGraw-Hill Book Co., Inc., New York, Toronto and London, 1949.

Observations on the Pathology of Hydrocephalus. D. S. Russell. Med. Research Council Special Report Series No. 265. 138 pp., illust. 6s. His Majesty's Stationery Office, London, 1949.

Pain Syndromes. B. Judovich, Instructor in Neurology, Graduate School of Medicine, University of Pennsylvania; and W. Bates, Professor of Surgery, Graduate School of Medicine, University of Pennsylvania. 357 pp., illust., 3rd ed. $6.00. F. A. Davis Co., Philadelphia, 1949.

Papers on Psychoanalysis. E. Jones, President of the International Psycho-analytical Association. 504 pp., 5th ed. $7.75. Baillière, Tindall & Cox, London; The Macmillan Co. of Canada, Toronto, 1948.

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THIRTY YEARS AGO . . .

From the *Journal* of September, 1919

SANITATION IN WAR, by John W. S. McCullough, M.D., D.P.H., Lieut.-Col. C.A.M.C. In every war the soldier faces two enemies; the one is the armed forces of the foe, with their terrible engines of destruction, the other the silent and in the past far greater foe, the grim purveyor of death, disease. The history of warfare for centuries has shown that of these two enemies the latter or silent enemy causes much the greater mortality.

War Statistics.—According to Longmore's tables, giving the statistics of war, and which are based on the records of battles for the past two hundred years, the usual story has been that four men have died from disease to every one from bullets. In the Russo-Turkish war, 80,000 men died from disease and 20,000 from bullets. In the Crimean campaign it is stated on eminent French authority that the Allies in six months lost 50,000 soldiers of disease and only 2,000 from casualties. In 1894, during the French campaign in Madagascar, of 14,000 men sent to the front, 29 were killed in action and 7,000 succumbed to disease, most of which was preventable. In the Spanish-American war, in a campaign of six weeks, the deaths from war casualties were 293 and those from disease 3,681, or nearly 14 to one. In the Boer war, there were 7,154 deaths from enteric fever alone or more than from all other casualties combined.

In comparison with the foregoing figures, it is stated on the authority of the Japanese Minister of War, that in the Russo-Japanese war, from February, 1904 to May, 1905, the total deaths from casualties and wounds were 52,946, or nearly 9% of the army, while the total deaths from sickness amounted to 11,992, or only 2% of the forces in the field. . . .

Sanitary Methods in C.A.M.C.—The sanitary methods followed by the Canadian Army Medical Corps were practically the same as those which were found effective by the Japanese. Competent sanitary experts were placed in charge, laboratories established, lectures instituted and all medical officers were required to pass an examination in sanitation . . .

The Results.—In the present war, the Canadians had about half a million men enrolled. Of these, counting from 1914 to December, 1918, according to official figures supplied by the Department of Militia and Defence, 51,853 died of wounds and but 2,815 from disease. In other words, the deaths from wounds were over 18 times as great as those from disease. These are astonishing figures, and, if they were not official, could scarcely be believed, when it is remembered that the deaths from disease in the South African War of 18 years ago amounted to 65% of the total death-rate. Note the comparison! 65% as against 5.14%. . .

NEWS. **Ontario.**—Announcement has been made by Hon. W. D. McPherson of the appointment of Dr. Harvey Clare to the Medical Director of Ontario Hospitals. The office, a new one, is taken as a forward step in Institutional management.

At a recent sitting of the Ontario Medical Council, . . . the notice of motion by Dr. Stewart condemning the Ontario Temperance Act, on the ground that it made the doctor the only medium between the Government and the Public for obtaining liquor was discussed at length, and it was finally decided by Dr. Stewart to withdraw the motion, on the ground that a referendum was to be submitted on the question soon, and that it would be inadvisable to press the motion at this time.

The late Senator H. W. Richardson has left a legacy of $100,000 to the Kingston General Hospital for treatment of tuberculosis only. A special wing will be built for this purpose in connection with the hospital enlargement scheme in the interests of Queen's Medical College.